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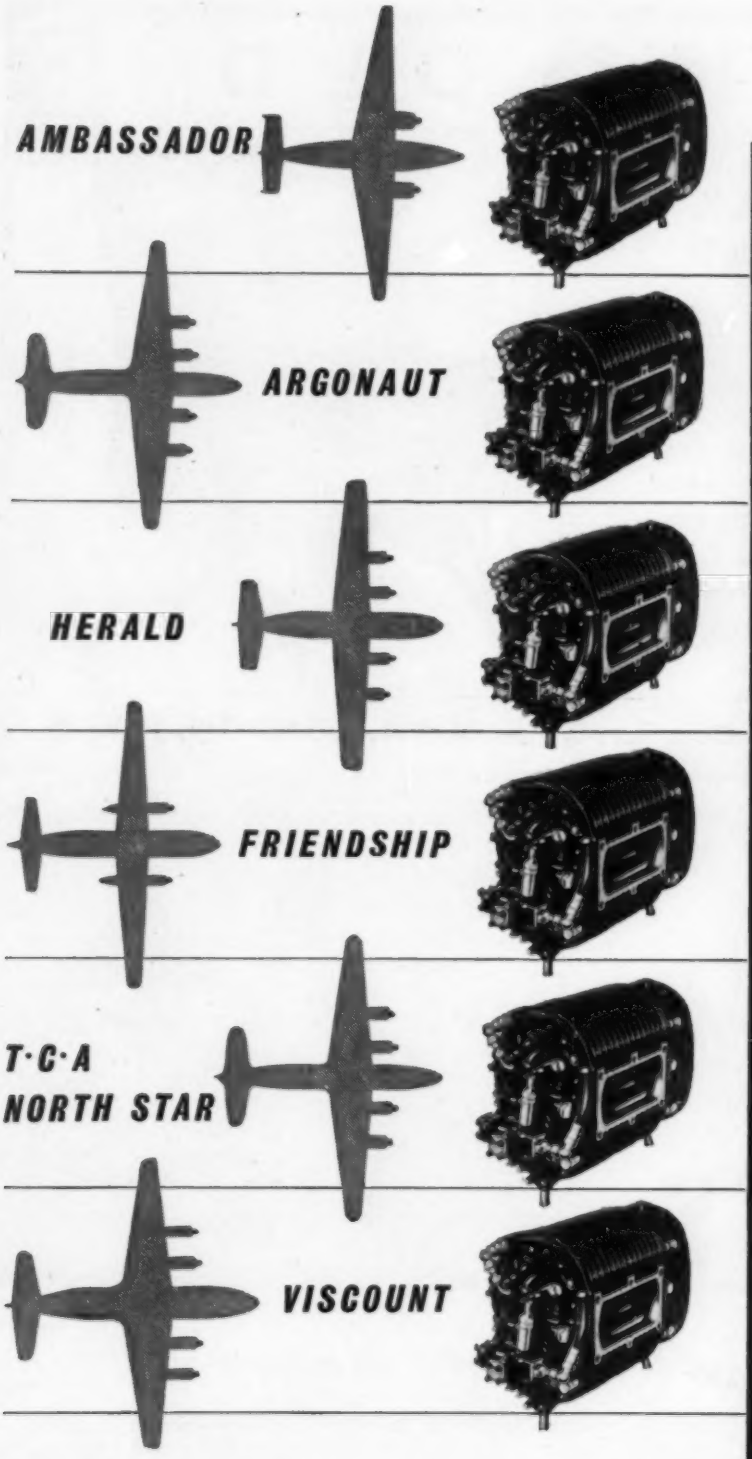


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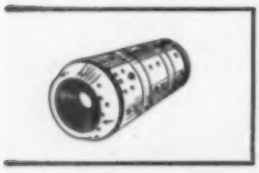

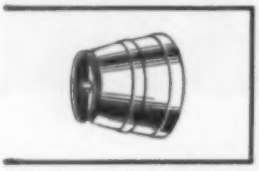

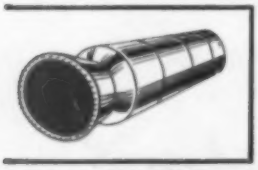

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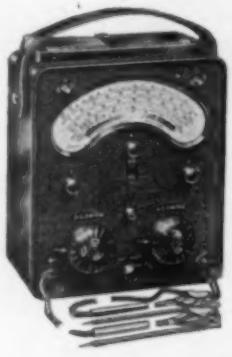

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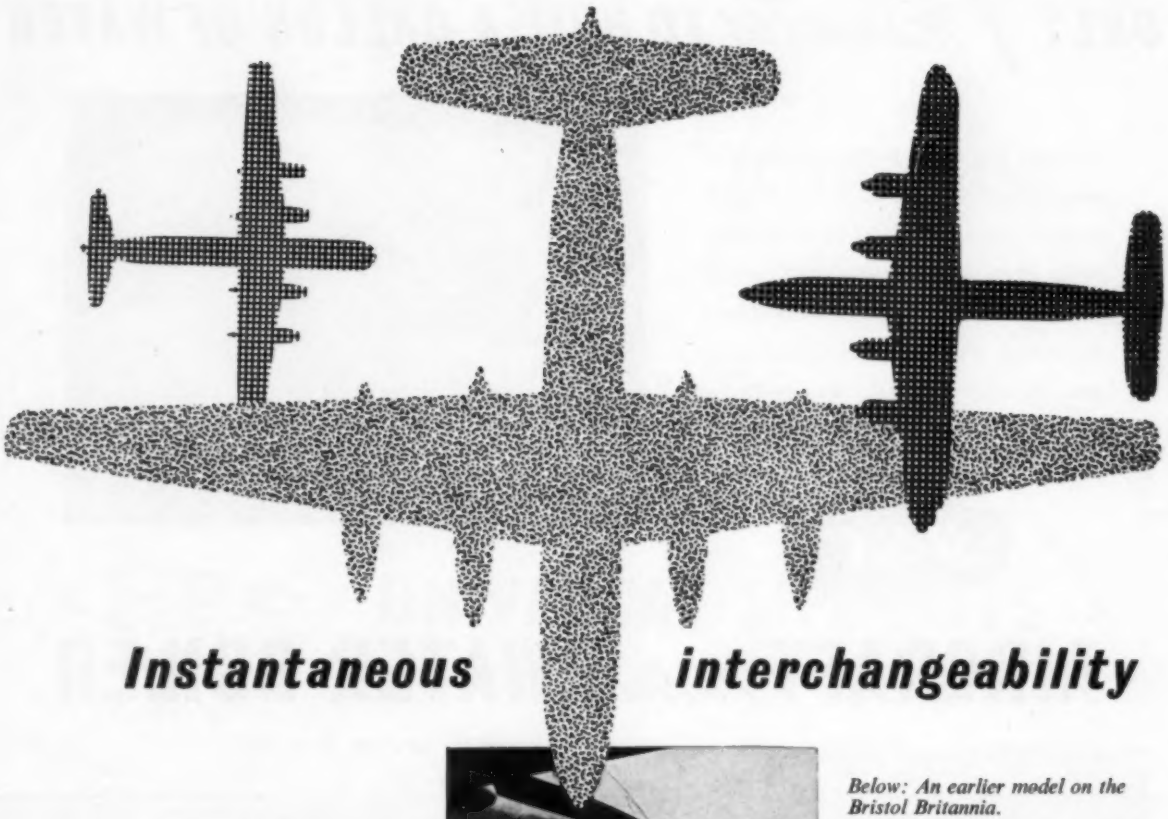

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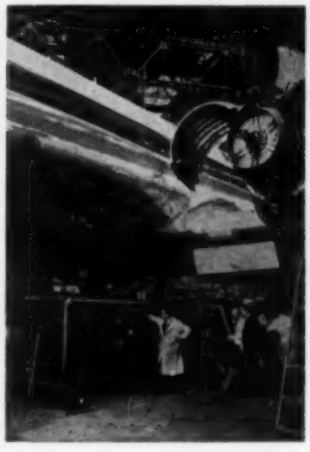
*Below: An earlier model on the Bristol Britannia.*



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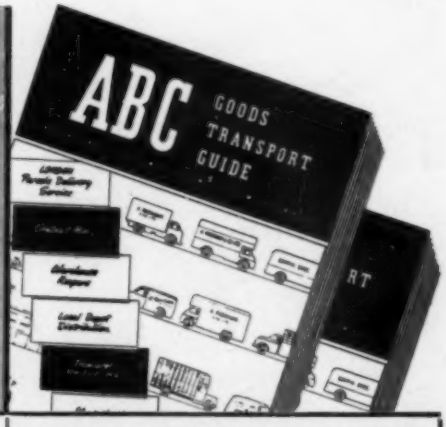


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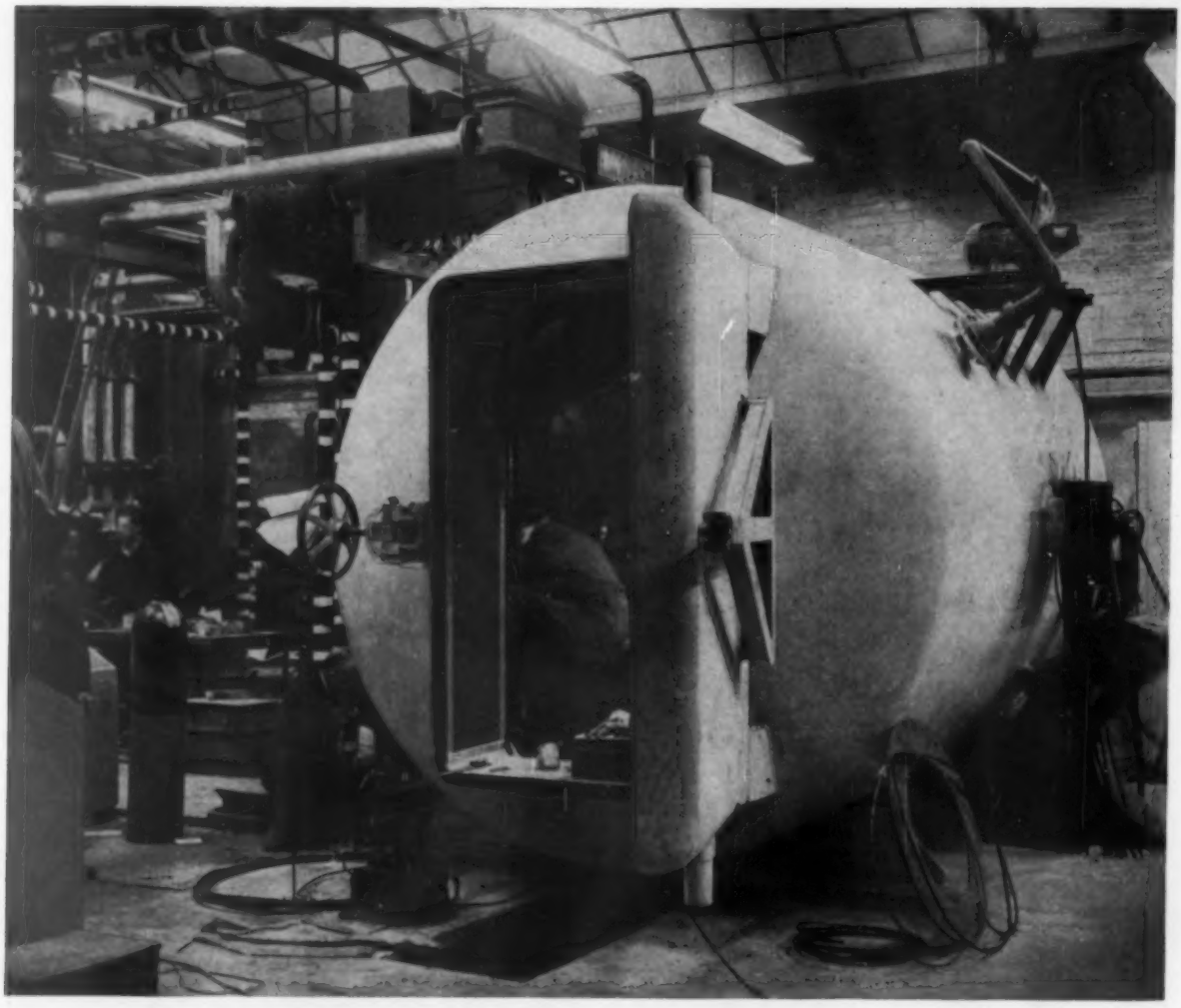

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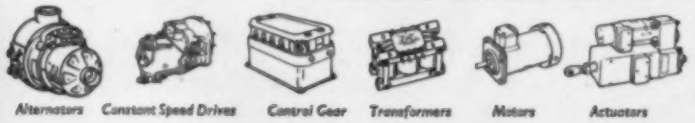


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FIRST AERONAUTICAL WEEKLY IN THE WORLD FOUNDED 1909

FLIGHT
and
AIRCRAFT ENGINEER

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# Ideas and Applications

QUITE the thing nowadays is a new sedative. Made up to the prescription "The Americans may be ahead; but we have the *ideas*," and swallowed after excesses of national pride and confidence, it can induce warm, rosy dreams of a golden age, when all the brightest ideas were British (until the base, commercially minded Americans seized upon them and turned them to immediate and profitable account). Soothing, too, is the feeling it imparts that everything is going to turn out well because we have the *brains*, whereas the Americans (as everyone knows) have only hordes of workers and masses of machines.

How unfortunate that, like most bromides, the new formula should prove depressing in reaction and flat in after-taste. Malaise returns, and with it the awful realization that chronic self-deception may be at the seat of the trouble. A clinical examination is, in any case, indicated.

The case history immediately shows that our national productivity of ideas, though never really unhealthy, has never been phenomenally high. The best inventions and innovations—jet propulsion not excepted—have generally developed in the natural order of things, as they have elsewhere, though occasionally they have had to be grafted on. (Under examination, let it be clear, are ideas *per se* and not their realization or exploitation.) So the popular superstition that we in this country have been vouchsafed an exclusive, inexhaustible, source of inventive thought can be dismissed together with the cold-key-down-the-back; and should any symptoms of anaemia be observed under the microscope, these are clearly not due to the depredations of parasitic bodies.

Surprisingly, perhaps, the idea-stream is seen to be healthier at this present time than for years past, and the explanation of this is both interesting in itself and hopeful for the well-being of the industry as a corporate body.

Apparent to the least practised eye is the strong condition of our turbojet and turboprop powerplants. Here, indeed, are practical ideas realized in terms of power, economy, compactness and lightness. But the intrinsic worth of the most remarkable engine is little more than that of an interesting specimen of metal-work: without imaginative application it may wither and die—or, equally likely, may suffer amputation by Ministerial order.

Today it may reasonably be asked if our powerplants are being applied either imaginatively or expeditiously enough, having regard to the ambitious schemes propounded in recent times. Of these we recall especially the Rolls-Royce jet-lift formula, whereby Mach-2-plus airliners or bombers (or, for that matter, other classes of aircraft) may take off or land both vertically and slowly; the principle of the jet flap, disclosed at the last S.B.A.C. Display and widely acclaimed by our visitors; and the Handley Page system of boundary-layer control, now put forward as a practical economical proposition for subsonic jet transports of a class typified in these pages last week.

Nor is it to such "paper" ideas that the industry may need to turn if it is to prosper in the years ahead. The time already seems overdue for our light, simple, powerful turboprops to be applied to short-take-off (or even vertical take-off) machines, just as the less efficient units of America and France are being applied to indigenous developments. We need only consider the Scottish Aviation Twin Pioneer as a prototype (in the true sense of the word) to visualize what might be accomplished with a whole range of transports for civil and military short-field applications, utilizing progressively more efficient powerplants and high-lift devices in many and various combinations.

Certainly at this present time we do have ideas—but through sheer imagination and effort, and not through any heaven-sent right; and if we do not put them to work in due time they will be taken from us and applied to our eventual shame and detriment.

Something, perhaps, is in need of a shaking up. And it is not the opiate to which we earlier alluded.

# FROM ALL QUARTERS

## The Iroquois

KNOWN for more than two years as the P.S.13 (Project Study No. 13), the giant turbojet designed by Orenda Engines, Ltd., for thrusts upwards of 20,000 lb, has now been named the Iroquois (pronounced Era-quah). The new powerplants will be installed in late prototypes and production models of the Avro Aircraft CF-105 twin-jet supersonic all-weather delta-wing intercepter. Test units have been running on the beds at Malton for more than a year and an example is shortly to fly in a Boeing B-47 loaned by the U.S.A.F. Astonishingly enough, this will be attached to the starboard side of the fuselage, in a pod *à la* Caravelle. Early prototype CF-105s will have Pratt and Whitney J-75s.

## A.W.A. Research Facilities Expansion

AN aircraft and guided-missile research and design centre, to be established by Armstrong Whitworth Aircraft, Ltd., on the site of their plant at Whitley, near Coventry, will form "one of the largest concentrations of aircraft and missile research and design facilities in Britain." The project is estimated to cost £1 million.

The centre will include design offices, laboratories and experimental shops. Equipment on order includes digital and analogue computors and pressure chamber facilities. The whole of the firm's design staff now at Baginton will move into the new establishment and additional staff will be recruited.

Plans also call for large-scale development of A.W.A.'s test airfield at Bitteswell, Leics. Runways are to be re-laid and strengthened, and sound-suppression pens will be built.

## M.o.S. Appointments

AT present Head of the Guided Weapons Department of the Royal Aircraft Establishment, Mr. W. H. Stephens is to become Deputy Director (Equipment) of the R.A.E. on July 1. He succeeds Dr. F. E. Jones, who is retiring from Government service.

The Ministry of Supply also announces that the Minister (Mr. Reginald Maudling) has approved a reorganization of senior engineering posts and has made the following appointments:—

Sir Stewart Mitchell, K.B.E., C.B., M.I.Mech.E., at present Controller, Guided Weapons and Electronics, to be Controller, Royal Ordnance Factories, and also Head of the Ministry of Supply engineering staff; Mr. A. T. Barnard, C.B., O.B.E., A.M.I.C.E., to be Director-General of Inspection (a new post); and Mr. R. Ratcliffe, M.B.E., M.I.Mech.E., to be Director-General of Ordnance Factories.

The Ministry has also announced the appointment of Mr. C. P. Fogg as Head of the Ground Radar Department, Radar Research Establishment, Malvern.

## Service Aircraft Variants

SOME new derivatives of established types of Service aircraft may now be named, though regrettably with only the briefest particulars.

The Hawker Sea Hawk F.B.5 and FGA.6 are, respectively, counterparts of the F.B.3 and FGA.4, probably having a later mark of Rolls-Royce Nene. Likewise the Fairey Gannet A.S.4 may be supposed to have a more powerful variant of the Armstrong Siddeley Double Mamba than had its forerunners. New target aircraft are the Fairey Firefly U.9 and Gloster Meteor U.15 and U.16, the Firefly with Rolls-Royce Griffon 74 engine and the Meteors with Derwent 8s. The Firefly U.9 is a conversion of the Mk 5, with new autopilot and electronic gear.

*LADY BOYLE, wife of Sir Dermot Boyle, Chief of the Air Staff, photographed after naming the Canberra P.R.7 "Aries V" at the Royal Air Force Flying College at Manby, as described on page 825. Escorting her is A. Cdre. G. A. Walker, the Commandant of the College.*

In addition to the de Havilland Comet C.2 transport and troop carrier (four Rolls-Royce Avon 117s), another Comet variant, designated T.2 and equipped for training, can now be mentioned. This has the same powerplant as the C.2 but does not, of course, need the strengthened floor for cargo carrying.

It may now be disclosed also that the Fairey Ultra-Light helicopter, intended for general reconnaissance duties but discontinued in development on instructions from the Ministry of Supply, is fitted with the Blackburn Turboméca Palouste BnPe.2.

## International Aerobatics

FIFTEEN entries have been accepted by the Royal Aero Club for the British Lockheed International Aerobatic Competition, to be held at Coventry Civic Aerodrome, Baginton, on July 20-21. Among them are the three Frenchmen who gained first, second and third places last year, M. Léon Biancotto, M. Alain Hisler and M. François d'Huc-Dressler, and a woman pilot, Miss C. M. Segado from the Argentine. All five British competitors in the under-1,750 kg category will use Tiger Moths.

This competition, now being flown for the second time, will form part of the National Air Races meeting. Each competitor is allocated five minutes for his performance, which must include a loop, a slow roll and a half-roll off the top of a loop, plus other aerobatics of his own choice.

Eliminating trials are to be flown on Friday evening, July 20, and six competitors will be selected to fly in the final the next day. The three prizes are: £500 and the trophy; £300; and £200. The awards are donated by the Lockheed Hydraulic Brake Co., Ltd.

Pilots and their aircraft are as follows:—

**Group 1,** aircraft over 1,750 kg (3,858 lb).—*Great Britain:* G. Worrall (Gloster Meteor 7/8), R. G. Wheldon (Hunting Percival Jet Provost).

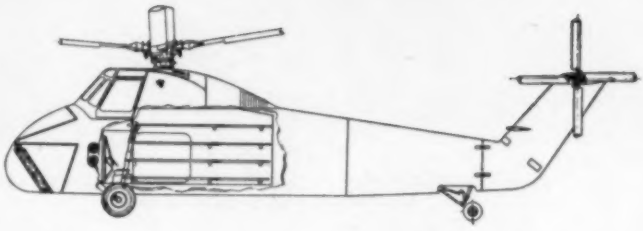
**Group 2,** aircraft under 1,750 kg.—*Great Britain:* F. S. Symondson, C. A. Nepean Bishop, F. C. Fisher, J. W. Tomkins, J. Pothecary (all on Tiger Moths). *France:* A. Hisler (Morane 230), L. Biancotto (Stampe S.R.7B), F. d'Huc-Dressler (Stampe S.V.4C), C. Dorgeix (Stampe). *Spain:* J. L. Aresti Aguirre (C.A.S.A. 1-133 Jungmeister). *Czechoslovakia:* J. Blaha (Moravan Z.226). *Argentina:* S. Germano (Focke-Wulf Stieglitz), Miss C. M. Segado (Focke-Wulf Stieglitz).

## Polish Airmen's Week

FROM Air Chief Marshal Sir Hugh Pughe Lloyd, chairman of the Polish Airmen's Week appeal, comes this message:—

"Of all the Allied armed forces who fought on our side during the last war, Polish airmen were the first to come to this country in strength. Fourteen Polish squadrons fought in defence of Britain. A great number of Polish airmen distinguished themselves not only in the Battle of Britain but in other theatres of war. . . . During Polish Airmen's Week (June 18-24), may I ask your readers to show their gratitude to those compelled to live in exile by sending a donation, however small, to the Polish Air Force Association, 14 Collingham Gardens, London, S.W.5. Donations will be gratefully received and will be used to assist widows and orphans, the sick, the disabled and those in need."

*ACCOUNTING AWARD: Mr. Charles Hill, chairman of Folland Aircraft, Ltd., receives from the Lord Mayor of London, Sir Cuthbert Ackroyd, one of "The Accountant" annual awards for 1956, given for well presented company reports.*



***MULTI-PURPOSE:** Though intended primarily for anti-submarine work, the Westland Wessex helicopter (news item on this page) is suitable for miscellaneous duties. The drawing below shows it with eight stretchers and an attendant's folding seat.*

## Plans for the Wessex

DESTINED for service with the Royal Navy primarily as an anti-submarine helicopter, the Westland Wessex will shortly go into production and should be available for service during 1958. It will be powered by two Napier Gazelle gas turbines mounted in the nose, and in addition to its anti-submarine task will be suitable for search and rescue, communications, supply, casualty evacuation and training. The crew will number two and accommodation will be provided for twelve passengers and baggage or for eight stretcher cases (see drawing in col. 2). For anti-submarine work "special equipment and strike weapons" will be carried. Both the main and the tail rotor will have four all-metal blades, and the flight controls will be in duplicate and servo operated. The tail unit will fold for carrier stowage. Principal data:

Overall length, 65ft 9in; length (tail folded), 38ft 2in; width, 13ft; overall height at main rotor, 14ft 3in; overall height at tail rotor, 15ft 10in; empty weight, 7,259 lb; normal all-up weight, 12,600 lb; internal freight load capacity, 2,000 lb; external sling load capacity, 4,000 lb; max. speed at s.l., 115 kt plus; cruising speed at s.l., 110 kt plus; max. rate of climb at s.l., 1,350ft/min; hovering ceiling in free air, 4,500ft; hovering ceiling with ground effect, 8,400ft; range (with normal fuel capacity), 382 n.m.; ceiling (cruising), 6,000ft.

## International Light Aircraft Meeting

THE sixth annual international light aircraft meeting is being held at Venice from July 18 to 22. Fast increasing in popularity, the event is likely this year to bring together most of the new light aircraft now being built in Europe. Helicopters and gliders will also be exhibited. Any aircraft not previously shown at these meetings are eligible.

From Monday, July 16, to Saturday, July 21, all aircraft will be sheltered and refuelled at the expense of the organizers.

Full details are obtainable from the President, VI International Aeronautical Exhibition, Aero Club of Venice, Venice, Italy.

## Valiant Accident Findings

THE co-pilot and only survivor of the Valiant bomber which crashed at Southwick (Hants) on May 11, F/L. C. D. Preece, gave evidence at last week's Shoreham inquest on the other three crew-members. The object of the flight, he said, had been to test vibration in the aircraft. For this purpose certain equipment was being carried. It was found unserviceable, so the captain decided to abandon the flight and return to Farnborough.

They were overweight for landing, so had to fly round to use fuel, keeping down to 1,000ft in order to consume it faster. Between Selsey Bill and Shoreham, S/L. Orman, the captain, said that he had "lost" the trimmer of the V.I. tailplane.

"Almost immediately he said the aeroplane had gone into manual control. . . . S/L. Orman took the necessary action. We managed to climb to about 2,000ft but we found it was impossible to prevent the left wing dropping and the nose went down. At about 1,500ft S/L. Orman gave the order to get out. . . . I think he stayed in the aircraft to let us all get out."

W/C. John Finch, from Farnborough, said that expert general opinion was that the principal cause of the crash was an electrical failure which could not have been foreseen during any ordinary maintenance or earlier in the flight.

The jury returned a verdict of accidental death on the crew—S/L. Orman, F/L. K. E. P. Evans and Mr. A. R. Knight (a M.o.S. assistant experimental officer)—and the coroner said that S/L. Orman had "acted in accordance with the very highest traditions of his Service."

## AIRLINERS TODAY AND TOMORROW

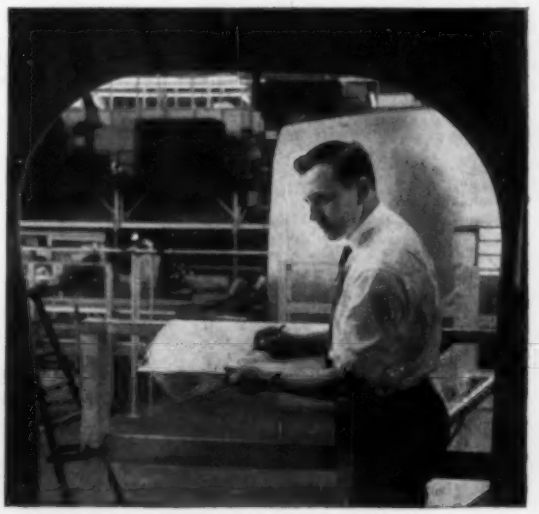
THE issue of *Flight* dated July 6 will be one of uncommon significance and interest. We intend, indeed, that it shall set a new standard in technical journalism.

Presented in over sixty pages will be an abundance of up-to-the-minute information—much of it released expressly for inclusion in this special number—on airliners that will dominate the international scene in the years ahead. To this compilation the planners, designers and operators of civil transports will be able to turn for a ready, graphic comparison of characteristics and data.

In particular we shall present a unique collection of detailed cutaway drawings, including the newest American turbojet and turboprop designs. Representing several weeks of work in the United States by *Flight* artist Arthur Bowbeer, the Douglas, Boeing and Lockheed drawings were made possible only by the most open-handed co-operation of the companies concerned. Generously acknowledging *Flight's* leadership in this field of aeronautical art, Mr. Bowbeer's hosts placed their new aircraft freely at his disposal and, in the case of the DC-8, Boeing 707 and Electra, gave him the freedom of engineering drawings and mock-ups.

The descriptive text, tables and graphs are being prepared by an editorial team working from data supplied by the makers concerned, and designers and senior executives have contributed personal notes on their technical and commercial philosophies.

The final result will thus prove invaluable to technicians and operators alike, and, affording as it will the first intimate view of all the great airliners in production or in prospect, will command a wide general readership.

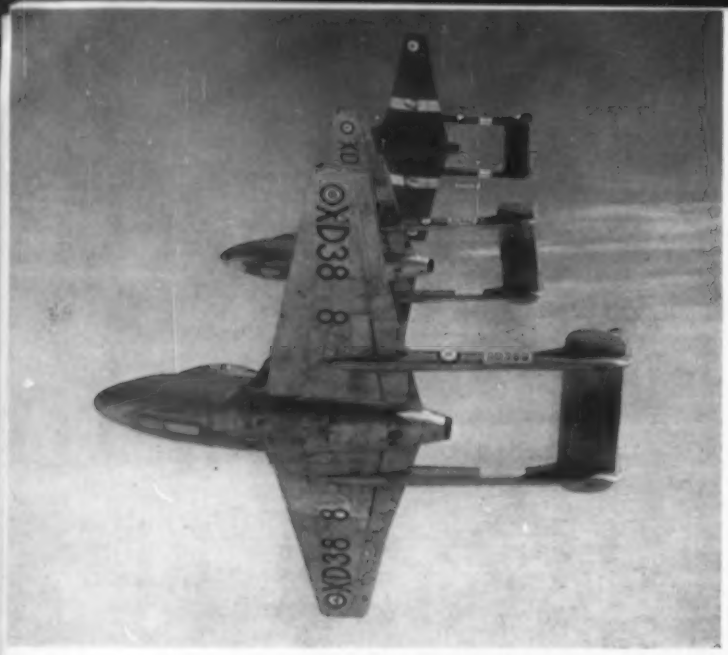


***MAN AT WORK**—on a Douglas DC-7C at Santa Monica—is "Flight" artist Arthur Bowbeer. The results of his recent labours (and those of his colleagues, under the direction of chief artist Max Millar) will be presented in the special issue of "Flight" announced in the adjacent note.*

# OFFICER MATERIAL

## *A Flying Training School Works to Produce the Complete G.D. Officer*

"FLIGHT" PHOTOGRAPHS



*Peeling-off in smart style: an Oakington Vampire fighter-bomber with two Vampire Trainers following suit.*

ONE of the hardest-working units in the R.A.F. is the Flying Training School. Just as a factory produces aircraft, the F.T.S. produces pilots to fly them; but while the factory must perforce submit to various technical delays, the F.T.S. may not. Though unpredictable delaying influences such as weather and unserviceability are allowed for, much careful organization and hard work is still needed to produce a finished human product to schedule.

The F.T.S.'s task is not simply to turn out pilots, but to produce G.D. officers who will be an asset to the R.A.F. throughout their Service career. And just as there is more to being an officer than wearing a different uniform from an airman, there is more to flying than being able to take-off and land. The extra qualities required are to some extent complementary. A certain amount can be done to bring them out in the air, but more is done in the slower environment of the ground training block. Nevertheless instructors are always aware that good pilot and officer material is innate rather than instilled. Since preliminary weeding out, both from the leadership and flying point of view, has been done by selection centres and in the basic flying stage, the jet F.T.S. such as Oakington can concentrate on developing the latent qualities of student officers as pilots and leaders.

A recent visit to No. 5 F.T.S. at Oakington served to show how this is being done. The station is organized on the traditional three-wing basis with administrative and technical wings supporting the flying wing under which student officers work. There are four squadrons in this wing, Nos. 1, 2, 3, and H.Q., the last-named concerned principally with standardization of training methods and supervision of instructional standards. In command of the flying wing is W/C. D. S. Hoare.

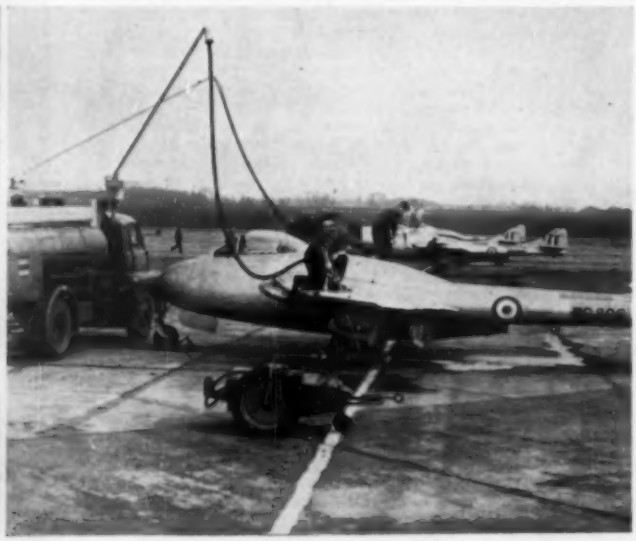
Until recently Oakington's main source of Provost-trained student pilots has been Ternhill in Shropshire, but now the piston F.T.S.s are pooling their output and distributing it according to capacity among all the jet F.T.S.s. After receiving their wings and commission parchments, pilots are then sent on to fighter O.C.U.s, like Chivenor or Pembrey. There they fly Vampires for tactical training for some time before converting to Hunters. This is a big step for them, but they take it without undue difficulty.

By the time they reach Hunters they can be termed picked pilots, with a sound background of jet and tactical flying. The majority of pilots now go first to fighter squadrons and gain the experience which will make them suitable for more complex flying—all-weather, instructing or bomber work. During their training courses some may be chosen for Coastal or Transport Commands.

The qualities required of a Service pilot are difficult to set out in writing, but an experienced instructor can spot at once many of the qualities which make a man unsuitable. It should be remembered that most pilots nowadays complete a tour on fighters before going elsewhere, because they are not acceptable for bombers and all-weather fighters without the ability and experience gained from a fighter tour. The fitness of pilots is therefore initially judged in relation to their aptitude for fighter flying, especially since the effective handling of a fighter now also requires the precise piloting, detailed knowledge and skill needed for larger aircraft.

Leadership in the air is one of the most necessary adjuncts. No

*(Left) Maps and charts: a familiar scene in the operations room. (Right) Four of Oakington's Vampires lined up for refuelling while (in the background) another lands after an exercise.*



pilot in a fighter squadron or bomber crew can get by without it. But there are two difficulties here. Leadership is not a quality easily found in men coming up for flying training nowadays, and leadership and flying skill are not always well combined in one man. Other very important qualities are an aggressive and resourceful mentality combined with thorough technical knowledge and the ability to fly accurately. Add to this intelligence and physical fitness and a mental alertness akin to that type of "low cunning" which often leads to success in wily games of strength played at the less inhibited parties. Timidity has no place in the air and is very easily spotted. Hard and fast tests for these qualities in the air are obviously difficult if not impossible to set. A great deal therefore depends on the ability and knowledge of the instructor, both in relation to the R.A.F.'s requirements and to the trainee's character. About the only test of this kind is that for instrument flying.

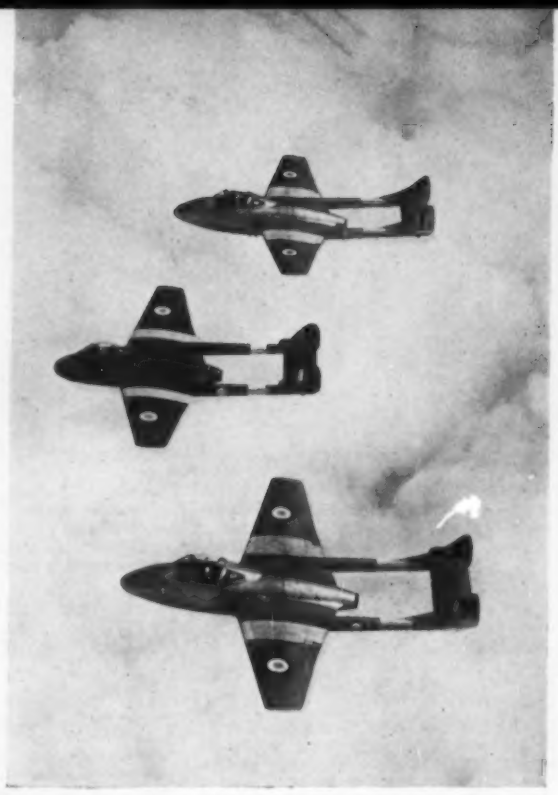
On the ground as much as possible is done to bring out the qualities just described, while at the same time inculcating the necessary technical knowledge. The latter takes the time-honoured form of lectures on and study of engines, aerodynamics, navigation, meteorology, airmanship, signals, weapons, aviation medicine, R.A.F. law, man-management and general education. The last-named is not as basic as it might sound because in addition to hearing lectures on world affairs and related topics, the student officers spend much of this part of their course working on their own initiative—preparing lecturettes or projects such as illustrated surveys of neighbouring towns or organizations. In the lectures on weapons mentioned above, basic instruction on guided weapons is included with the traditional "gunnery and bombery."

Great prominence is given to initiative training both for the development of character, and because it goes as far as possible towards replacing the escape and evasion training which is very necessary for aircrew. Full-scale escape and evasion exercises have now been discontinued because of inconvenience to the public in general and particularly to farmers. Initiative exercises take a number of forms, and are often based on the traditional formula of sending small groups or individuals to out-of-the-way places with only 15s and some specific task to perform within a limited time. This might be the surveying of a village for suitable defence positions and helicopter landing grounds, on which a written report with sketch maps must be submitted. Meanwhile transport, food and shelter must be obtained without exceeding the allowance and, of course, without breaking the law.

Traditional P.T. is important and has now been renamed fitness training. It includes games and special exercises for aircrew such as synthetic parachute training with instruction on steering and landing, wet dinghy drills and swimming training. Every aircrew member must now be able to swim something over 10 yd by the time he gets his wings. Alternatively he can gain a certificate as a qualified swimmer if he is able to cover a considerably longer distance. Life-saving training may also be introduced at No. 5 F.T.S. as an extra activity. To build up stamina and agility, an assault course and road work are being added. Oakington is a keen sporting station and its teams have now won all the cups awarded in No. 25 Group. These include squash, lawn tennis, tug-of-war, athletics, boxing and rugby seven-a-side. There are twelve different soccer teams.

Because of the strict requirements of the training programme, flying intensity is high at Oakington and the air traffic controllers have a considerable task. Oakington itself and its relief landing ground at Graveley handle many thousands of movements each month and, because most of the flights are made by pupils, careful supervision is necessary. A great factor in this has been the "jet clock," invented at Oakington and now used at several other stations. It consists of a contacting electric clock connected to a circular plotting board so arranged that buzzers sound to remind controllers to check such items as pupils' oxygen setting and airborne time at correct intervals after take-off. A more recent device is a slide-rule-type computer for calculating an aircraft's course from bearings received at certain times. It will more quickly determine an aircraft's course when its compass is unserviceable than the traditional plotting method. Having first started work with a C.R.D.F. homer, Oakington had a manual homer installed at Waterbeach so that cross bearings could be taken to give an aircraft a distance as well as a bearing from base. Though this is useful for approach work it is not the complete answer, and a Cossor Approach Control Radar is being set up. This is a small equipment with the scanner semi-permanently located close to the instrument runway, with the operator accommodated in a hut close by. The approach controller will continue to work in the tower while talk-down is given from the hut.

It was at Oakington that the Vampire part of the Provost/Vampire training scheme was initiated, soon after No. 206 A.F.S. was renamed No. 5 F.T.S. From that time till now G/C. C. R. J. Hawkins has commanded the station and has been responsible for making the Vampire stage of training a practical and efficient process. He has now been appointed S.A.S.O. at No. 23 Group with overall responsibility for piston-engined basic training, and his place at Oakington has been taken by G/C. J. E. Kirk, who came from the British Joint Services Mission.



*Another impression of Vampire Trainers with a fighter-bomber.*

*An Oakington pupil on the point of a neat touch-down.*

*UNCONVENTIONAL UNDERCARRIAGES are associated with these two pictures. On the left, together with company officials, are pilots who have lately flown the trolley-launched S.E. Baroudeur: (l. to r.) W/C. H. F. O'Neill, D.F.C., R.A.F., H.Q., A.A.F.C.E.; M. Nadot, S.E.'s general flight-test manager; M. Barrière, flight-test manager; Maj. A. Murray, U.S.A.F., test pilot of AGARD; M. Maulandi, S.E. test pilot; and Maj. Baillot, in command of French Air Force service trials of tactical fighters. The Stinson Voyager on the right (see Col. 3) has the new Goodyear low-pressure Terra-Tyres and is seen taxying at speed over two-by-four blocks and planks.*

# HERE AND THERE

### Viscounts for Peru

IT is announced that Compañia Cubana de Aviacion, the airline which bought three of Airwork's Viscounts, have now ordered four 810s for delivery in the latter part of 1958. The third aircraft of the original Airwork order made its first flight last week.

### Sir Archibald Hope

WE learn as we go to press that Sir Archibald Hope is joining the English Electric group, as a director of D. Napier and Son, Ltd. It is understood that he has resigned his directorship of Airwork, Ltd., and that he is also likely to resign from the post of chairman of the British Independent Air Transport Association.

### Six Hundred B-52s

A WASHINGTON report last week-end said that Lt-Gen. C. S. Irvine, Deputy Chief of Staff in charge of Air Force production, had told a Senate sub-committee that the U.S.A.F. plans to have 600 B-52s by 1959. The sub-committee was investigating some shortcomings in the delivery of B-52s. The new figure of 600 is higher by 100 than the last-released official number ordered.

### Revolutionary Rotor

A CONTRACT for the design, manufacture and flight-testing of a helicopter rotor which the originators describe as "vibration-reducing, low-maintenance and low-cost" has been awarded to the Piasecki Aircraft Corporation, Philadelphia, by the U.S. Army. The Corporation says the rotor "eliminates many parts in the present assembly of rotor blades and their attachment to the drive shaft and 80 per cent of the bearings in the present hinge-assembly design." Though designed specifically for replacement in the H-25, now used by the Army for training and light transport, the new rotor design can be extended to replace other existing systems.

### Air League A.G.M.

THE annual general meeting of the Air League of the British Empire is to be held at Londonderry House, 19 Park Lane, London, W.1, on Thursday, June 28 at 2.30 p.m.

### Capt. Anthony Spooner

AUTHOR of our exclusive contribution on "Flying the Boeing 707," the concluding instalment of which begins on page 799, Capt. Anthony Spooner is to attend H.R.H. the Duke of Edinburgh's Study Conference at Oxford during July. He was nominated by the T.U.C. as chairman of B.A.L.P.A. and is not representing B.O.A.C. in this instance. He remains a member of the B.O.A.C. Aircraft Procurement Committee, now sitting to determine the Corporation's future requirements.

### Seamew Crash Inquest

AT a Belfast inquest last week on S/L. W. J. Runciman, of Short Bros., Ltd., who lost his life whilst demonstrating a Seamew at the R.A.F.A. display on June 9, it was stated in evidence that the aircraft appeared to start a slow roll. The nose fell, and the pilot seemed to be trying to finish with a half-loop, but had insufficient altitude; the Seamew struck the ground practically nose first. The jury returned a verdict of accidental death, and the coroner commended Mr. John Hutchinson, senior air traffic controller, for his promptitude in getting the fire crews into action.

### Machine Tools on Display

TODAY, June 22, the International Machine Tool Exhibition opens at Olympia, London, and remains open from 9.30 a.m. to 6 p.m. (weekdays) until July 6.

### Tyres for the Rough

THE undercarriage of the Stinson Voyager illustrated above was redesigned by Goodyear to incorporate two 24in-wide, flat-sided, low-pressure tyres, complete with brakes. Operating pressure during tests, one of which is shown, varied from 3 to 8 lb/sq in. The company is exploring the aviation usage of these "Terra-Tyres" by taking the Stinson in and out of marginal landing areas.

### Friends from Australia

THREE Australian visitors we have had the pleasure of meeting during recent weeks have been Mr. D. G. Anderson, Director-General of Civil Aviation (here for the Commonwealth Air Transport Council meeting, and now about to visit the I.C.A.O. assembly in Venezuela); Mr. Peter Birch, a director of Rolls-Royce (Australia) Pty., here to visit the parent company; and Capt. L. McK. Johnson, chairman of the Aero Club Federation of Australia, which is affiliated to our own A.B.A.C.

*AT BRISTOL on June 11 was Sir George Cribbett, deputy chairman of B.O.A.C., seen leaving the Britannia assembly hall with Mr. Peter Masefield, managing director of Bristol Aircraft, Ltd.*

*LEAVING AVRO: Mr. Philip Kidson, in charge of Avro publicity, who, as announced on page 766 last week, is leaving to take up work in southern England.*

*"Although the aircraft has a servo-tab control system, the controls can be checked for full movement on the ground."*

# FLYING THE 707

## *A British Pilot Tries Boeing's Jet Transport*

**PART 2**

**By CAPT. ANTHONY SPOONER**

**IN these pages, Capt. Spooner, D.S.O., D.F.C., continues his account of a visit to Seattle, where he was invited by the Boeing Airplane Company to sample the prototype 707. A senior B.O.A.C. Stratocruiser captain, and chairman of the British Air Line Pilots' Association, Capt. Spooner made the flight as a representative of pilots, and not as a prospective customer. In Part 1, last week, he described preparations for 707 production and commented on various features of the aircraft. Here he tells the story of the flight, which was made in company with "Tex" Johnston, chief of flight test, and his henchman "Dix" Loesch, who acted as flight engineer. A few company officials went along for the ride.**

ENGINE starting is pneumatic, in keeping with the modern American practice of dispensing with the battery and using direct A.C. generation. There is, of course, a small D.C. battery for certain secondary purposes. Various devices are offered by Boeing to enable one engine to be started without the use of specialized pneumatic ground starting equipment. The customer can take his pick according to the weight penalty he is prepared to stand. The internal starting systems are a combination of electrical, pneumatic and combustion and the air supply required is drawn from compressed-air bottles.

Engine starting appears to be a simple operation but, as I have explained before, it must be performed largely by the pilots, since the flight engineer has no physical control over the one set of throttles aboard. Once one engine is running, the others can be started internally by using the air supply and electrical power generated by the engine so running. It was worth noting here that all four engines will be fitted with 30 kVA A.C. generators driven by Sundstrand drives. Starting certainly takes no longer than in piston-engined aircraft and from the cockpit the operation is practically inaudible. Indeed, the sound level in the cockpit is remarkably low at all stages of flight.

Taxying presented no problems apart from some difficulty experienced in unlocking the parking brake. I did criticize, however, the size of the nose steering wheel; I would have preferred a wheel of much bigger segment. From an airport congestion angle the inability to lock the tandem bogie mainwheels on the inside of a turn may make the parking of the aircraft in a confined space a difficult problem. I understand that there is on the market a polished steel plate which ground crews can insert under the inboard wheel. This acts as a turntable and enables the aircraft to execute the equivalent of a wheel-locked turn. I also understand that some airports are building in similar turntables as a permanent feature of the apron areas.

The weight at which the Dash Eighty [as the prototype is usually called] was being flown was at almost irreducible minimum since it had been flying nearly all morning and refuelling would have caused a delay on a ramp which was packed solid with production B-52s. At take-off, we were about 122,000 lb. ("Child's play to four derated J57s producing about 9,500 lb thrust per engine.") Fuel on board for this flight was about 20,000 lb.

I had expected Tex to do the take-off, but no sooner had he asked me to unlock the parking brake and steer the aircraft down the commencement of the centre line (both parking brakes and nose steering are controlled from the captain's seat alone) than he called, "You've got it. It's all yours." Nosewheel steering was gradually abandoned to rudder pedal control at about 80 kt and at about 100 kt the nose was raised well clear of the ground. At about 120 kt, without any real recognition of the fact, I became aware that we were airborne. It is interesting to note that, due to careful design and recognition of the dangers involved, this aircraft is not unduly affected by an apparent tail-up or tail-down configuration. It will fly off at almost any reasonable attitude and the fore-and-aft-trimming device is compensated by the individual M.A.C. percentage as listed in the load sheet. Gear and flaps were raised without any noticeable change of attitude and the aircraft commenced climbing at alarmingly steep angle at about 4,000 ft/min with a rapidly *increasing* indicated air speed.

The problem with this particular prototype is that there is a limitation speed of 180 kt with the flaps in the take-off position. This is being improved in the production models, which are designed to permit a take-off-flap speed of up to 220 kt. Since I had not located the flap indicator and was not anxious to exceed the 180 kt limit until absolutely certain that the flaps were full in, I practically had to stand the aircraft on its tail to keep the speed down whilst checking with Tex that the flaps had come full in.

In all, it took seven to eight minutes to reach an altitude of

## FLYING THE 707 . . .

31,000ft with an airspeed indicating between 250 and 300 kt. At this height the aircraft was clearly hungry for more altitude, since, although we were now climbing at Mach number 0.8, the rate of climb still indicated about 4,000 ft/min. (We were, of course, almost incredibly lightly loaded.) The control of the aircraft did not present a fraction of the difficulty the instruments did. The latter problem was purely a question of unfamiliarity. For example, the airspeed pointer rotated through 360 deg to indicate each 100 kt and it took me a little time to locate the sub-pointer that showed whether I was going at 210 or 310 kt I.A.S. Likewise, with an altimeter winding-off the tens of thousands of feet so rapidly, I had to hunt about with my eyes for the little hand showing me whether I was at 6,000, 16,000, 26,000 or 36,000!

The Sperry Flight Integration System was also strange to me, but once I discovered a standard-type artificial horizon I concentrated upon this rather than upon the complicated unfamiliar instruments. The rate-of-climb indicator was off the clock most of the time, due to our phenomenal rate of ascent, and the tiny r.p.m. dials in the centre panel presented a percentage of maximum r.p.m. rather than the r.p.m. themselves. Never having flown a jet aircraft before, the significance of the other engine instruments was largely lost to me.

Controlwise, the aircraft was almost perfect, except that I found myself fiddling about with the fore-and-aft-trim device rather unnecessarily.

The flying control system is worth a chapter itself, and so much has already been written that I hesitate to add more. However, to pass lightly over such perfection is to do it less than justice.

Basically, the aircraft has a spring servo-tab system. The forces acting upon these tabs move control surfaces which are aerodynamically balanced. Both controls and tabs are also statically balanced, so that when the aircraft is at rest there is nothing dangling down. The aerodynamic balancing is achieved *internally* by methods which Boeing have evolved from much wind-tunnel experiment, backed up by many thousands of hours' flying experience.

Allied to this are two extra control forces. These are an adjustable horizontal stabilizer and two supplementary lateral control systems. The adjustable horizontal stabilizer can be controlled either manually or electrically; and in practice the latter is used, since some 90 turns of the trimming wheel are required between full tail-up and tail-down positions. Manually, this would require considerable physical effort. The electrical system operates through a clutch to the same trimming wheel as is used manually, and when electrical actuation is called for this trim wheel literally whirrs around. However, if the electric motor did happen to run away (a most unlikely event, since elaborate precautions have been taken to prevent this), the trim wheel can be stopped physically. It could, however, cause a pilot to lose some skin, and it might perhaps be preferable to use the sole of the shoe rather than the palm of the hand. Regardless of this fact, the most satisfactory feature of this device is that, provided a good c.g. position is established, it does not matter very much where the horizontal stabilizer is. Except when being flown at the extreme limits of the c.g. range, the aircraft can be handled (and, I believe, even landed) with the trim wheel right forward or right aft. It simply requires greater stick forces. My error in fiddling with the trim wheel was that I was trying to achieve a perfect hands-off trim by a cautious turn or two of the wheel. These little movements had practically no effect whatsoever until I grasped the idea that I really had to spin the wheel like a rotary polishing mop for anything noticeable to take place.

Lateral control is threefold. There are two separate sets of ailerons and the lift spoilers (two a side, on top of each wing). The asymmetrical use of these spoilers provides, in effect, a third set of ailerons. They are normally used as ailerons throughout the entire flight and except when disengaged (when they lie flat) or when no hydraulic pressure is available (when they also lie flat), they are automatically connected to the aileron movement of the control column. Even when being partially used symmetrically as speed brakes, they still act as additional ailerons. When the spoilers are in the fully "up" maximum speed-brake position, then and then only is partial aileron effect lost, because it is impossible to raise the spoilers more than 100 per cent. But even in this case there is a little aileron effect, since the hydraulic follow-up mechanism does have the effect of slightly depressing the spoiler which is on the outside of the turn. However, since spoilers are only used as full dive brakes or speed brakes for an emergency descent or some such unusual proceeding and are normally partially used in the symmetrical configuration, the condition of being deprived of aileron (spoiler) effect seldom applies. Of the two normal sets of ailerons, the outboard set is only effective when the flap is down. With the raising of the flaps after take-off the gearing of this set of ailerons is progressively reduced to zero. On take-off, I tried to detect a reduction in lateral control ratio as the flaps came in, but I was unable to do so; nor did I notice any increase in aileron effect when, ultimately, I lowered flap prior to landing.

*Reading from the 707's wing-tip inwards can be seen outboard aileron; outboard slotted flap with outboard spoiler fully raised; inboard aileron; inboard slotted flap. In this instance spoiler is being used as air-brake.*

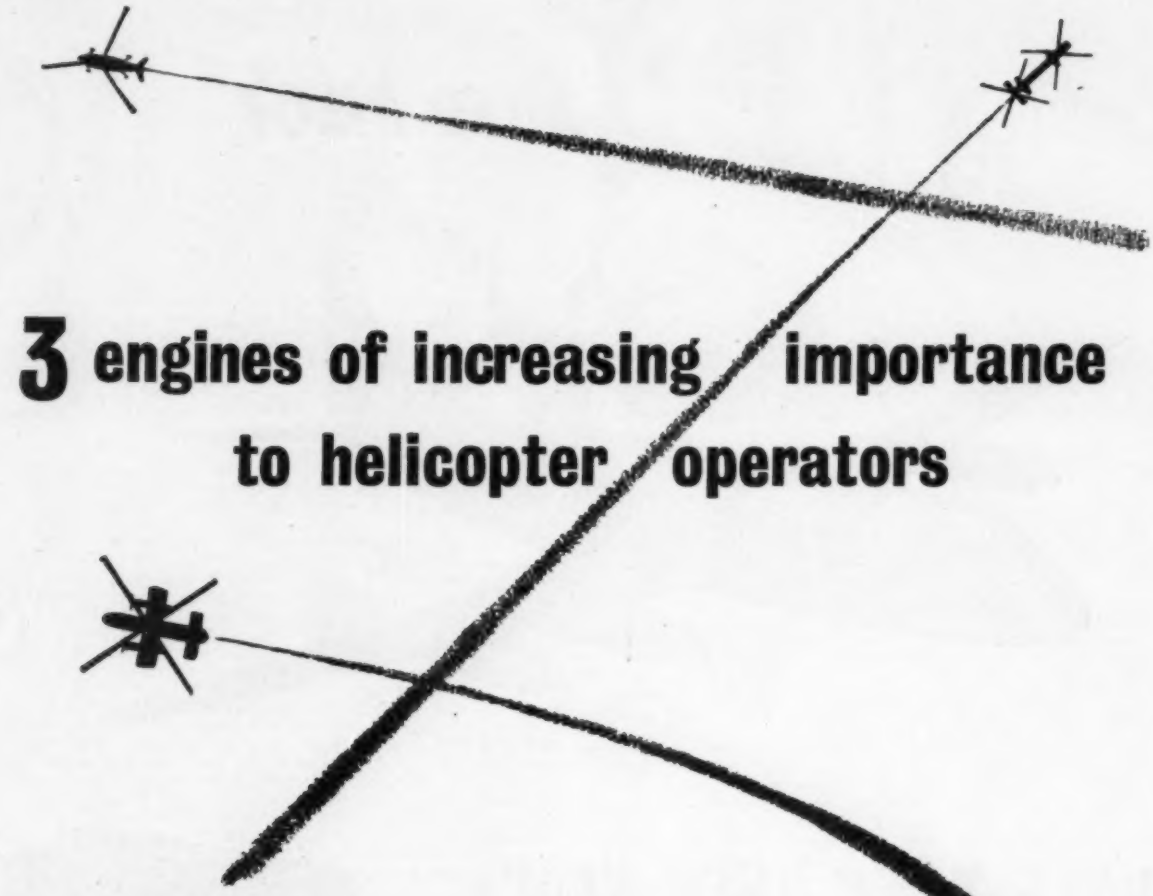
In normal flight, the rate of roll is considerably more effective than on any large aircraft I had previously flown, and a good feature is that maximum bank can be achieved without the control wheel exceeding 90 deg of movement. Thus a pilot does not get himself into the hands-crossed-over position so difficult to maintain without change of grip. Since the spoiler-aileron device is hydraulically operated, the question at once arises of what happens if the hydraulics fail. As previously mentioned, the mechanical effect is for the spoilers to lie flat. The aircraft is now entirely controlled laterally by the small-area inboard ailerons and, to my surprise, the effect on control at speed is almost negligible. I did not have occasion to try out this situation at low speed; but the aircraft has often been landed with the hydraulic power to the spoilers switched off, so the effect is certainly not one liable to cause a disaster. I did try 60 deg bank turns at Mach number 0.83 using inboard ailerons alone and I was able to swing from one turn into the opposite turn with far less effort than required when flying a Stratocruiser. With the spoilers operating this manœuvre, more can be achieved easily with one hand.

Those who saw Tex Johnston perform an upward barrel roll in the 707, starting from only a few hundred feet up, can bear witness to the aircraft's impressive manœuvrability.

The rest of the flying programme was taken up with demonstrations of stalls clean and stalls with everything dangling. In both cases, lateral control was available down to the stall, with ample warning provided by buffeting which commenced mildly at about 20 kt above the stall and progressed to a horrible fierceness. This is an aircraft that needs no artificial stall warning device.

Recovery from stalls presents no difficulty. Some time was spent in the air slamming throttles back and then, with the engines idling, pushing the power hard against the forward stops with the kind of rough movement normally only reserved for opening swing-doors. The absence of engine surge or pulping was remarkable. Equally remarkable was the almost instantaneous power response. As one threw the throttles forward one was almost hit in the back by the acceleration forces.

At my request, Tex demonstrated an emergency descent. At the time we were cruising along at some 310 kt I.A.S. at a height of about 33,000ft. First action is to close the throttles and apply full air brake. This is always possible, since there is no speed limitation on the spoilers. The gear can be dropped at 270 kt I.A.S. and, in a matter of seconds after pushing the control column hard forward, Mother Earth appears straight in front of the windscreen. Once the gear is fully down, the speed can be



# 3 engines of increasing importance to helicopter operators

**ELAND** Fairey's new large transport helicopter, the Rotodyne, is to be powered by two *Elands*—basically similar to the standard *Eland* but with an auxiliary compressor mounted co-axially at the rear. Power is taken through the auxiliary compressor (in the form of compressed air to the rotor) for vertical flight, and through the propeller for forward flight.

**ORYX** Two Napier *Oryx* engines have been mounted in the new Percival P74. Napier worked with Hunting Percival in the development of the *Oryx*, a 780-825 gas h.p. turbo-gas-generator which has been officially Type Tested at 780 g.h.p. This new Napier power unit eliminates all mechanical transmission.

**GAZELLE** This 1,260 s.h.p. Free Turbine helicopter engine is another Napier engine which is going places. Two *Gazelles* will be mounted vertically in the Bristol 192, a new twin rotor helicopter, and one *Gazelle* will power the Westland "Wessex" helicopter which is being adopted by the Royal Navy. The engines are directly connected to the rotor heads, providing mechanical transmission in its simplest form.

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*S.E.P. 2 Flight panel.*

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## FLYING THE 707 . . .

increased to 320 kt I.A.S.; and, though now only inboard ailerons are effective, ample lateral control is available. On the descent we lost about 18,000ft in one-and-a-half minutes in spite of having to make turns away from the mountain ridge I happened to be diving at.

Another demonstration I was able to try was the sudden pulling back of an outboard engine. Almost no yaw effect was felt and one twist of the rudder trim-control wheel restored flight to normal. The engine was then completely stopped and relit without fuss or ado, although it was felt necessary to limit our three-engine speed to 240 kt prior to relighting. In this case, relighting was performed at about 25,000ft; but, I understand, relighting can be performed at up to 40,000ft.

As we had now been up about one hour, our limited fuel supply was running low; so, after Tex had exchanged the right-hand seat with Dix, we proceeded back to Seattle, noting on the way how effectively the D.M.E. was performing. This appears to give accurate indications beyond 100 miles.

As far as I can recollect, the highest Mach number reached during this flight was about 0.86. At no time was a noticeable change in pitch or roll apparent and, except when actuating the air brakes at speed, there was no buffeting. The aircraft is guaranteed to Mach 0.88 and has been flown up to at least 0.95. The buffeting experienced by applying the spoilers as air brakes was of moderate character and did not prevent normal control movements from being made.

When at about 4,000ft downwind of the airport and at about 240 kt I.A.S., Dix suggested that I might like to figure out an approach on the landing circuit for myself. In the absence of any guidance other than that the speed over the fence should be about 120 kt, this was an interesting exercise. The speed was rapidly lowered by the immediate dropping of the gear and, on a wide base leg, I was able to get the approach flaps down at 180 kt. Power was controlled by pushing or pulling throttles, by feel rather than by reference to unfamiliar (and largely incomprehensible) engine instruments. Responses were so rapid that this method proved quite effective. On finals, full flap was called for at 140 kt at about 300ft up, and this was accomplished with little noticeable change of attitude. The 707 is not one of those aircraft which dives steeply with the application of landing flap. The lowering of initial flap, 30 deg, did cause a slight nose-down attitude, but I did not feel any urgent need to trim this out, preferring to hold back the nose-down tendency by slightly increasing the backward stick force. There was a slight balloon effect on the flare-out, but it was not of such magnitude that a sudden forward movement of the control column was called for.

A smooth touch-down was made with the nosewheel held off the runway and there was no tendency either to sink rapidly immediately prior to landing on or to bounce after touch-down. We did float half-way down the long runway but this, I think, was due to the fact that the 120 kt speed over the fence incorporated a generous margin for beginners and also to the fact that I had forgotten I was supposed to be doing my own throttle movements and had, out of force of habit, called for "power off" instead of doing so myself. On the spur of the moment, Dix suggested that I make the landing a touch-and-go. All that was required was a positive grounding of the nosewheel by a push forward on the control column and the opening-up of the throttles while Dix retracted the flaps to the 30 deg position.

Acceleration response was almost immediate and before I had time to get my hand away from the wide-open throttles I was again pointing almost straight upwards in an endeavour to stop the speed building up beyond the 180 kt limitation. I was still having trouble in locating the flap-position indicators, possibly due to the fact that each of the four large double-slotted flaps has a separate indicator needle. These are mounted on two gauges on the pilot's instrument panel and from habit I was looking for one large gauge on the co-pilot's side of the aircraft.

The next circuit was a much tighter and neater affair and unremarkable except that Dix showed me by how much I ought to trim out the slight nose-down effect which appears upon initially lowering the flap. For literally second upon second, he made the trim wheel fly around (I personally thought that the electric motor had run wild); but, at the end of it all, though the trim indicator was far removed from where I had had it for my first landing, I did not notice any appreciable difference in the handling of the elevator control and my final landing was done with some real measure of confidence, in spite of the fact that I had only been in the aircraft some 90 minutes and had had no proper dual and still had no accurate notion about the correct speed and approach pattern drills. Incidentally, it is worth notice that, with no magnetos to check, no propeller-pitch settings to bother about, no cowl-flaps, no intercoolers, no oil-cooler flaps, no radiator settings, the field-approach check-list is reduced to almost nothing.

On this our final landing, Dix showed me how to unload the wing by raising all the spoilers to their maximum immediately on touch-down. After this manœuvre, positive nosewheel steering and brake application are available. Whether one can land with the spoilers full up I did not check, but I believe that the effect upon stalling speeds is less than 5 kt. In the landing attitude these spoilers, when used fully, do exert some pitch-down attitude necessary for immediate effective braking.

*"Dix" (left) and "Tex" dwarfed by the nose of Dash Eighty.*

At this weight, now only about 107,000 lb, the aircraft used very little runway in spite of the fact that there is no reverse-thrust mechanism fitted to the Dash Eighty. Against this fact, however, it must be remembered that production 707-120 aircraft using this same wing area will be cleared for landings up to 165,000 lb.

A general assessment is difficult to arrive at. I suppose that my dominant impression is that the aircraft, as I flew it, was almost incredibly simple to manipulate and easy to fly. Yet it is as powerful as it is docile. I believe that Boeing estimate that the cost of the Dash Eighty prototype has been about $16 million (nearly £5¾m) of their own money, and I think that the manner in which they allowed a non-jet pilot to throw it about and to handle it close to the ground is perhaps a better indication of its qualities than words can express. Some 50 "unfamiliar" pilots have done as much, or more. These facts speak for themselves.

The next morning was taken up discussing with Ray Chamberlain and Mr. Downey the final engineering details of the control system. Jack Steiner later joined in the conversation and a discussion developed about the need for greater rudder throw and/or aileron drag effect in the low-speed (0 to 60 kt) case as applicable to icy runways. I was favouring the addition of a booster rudder in order to obtain some positive ground control. In this respect, the aircraft is somewhat similar to the Bristol Britannia. The situation may resolve itself when engines of greater power, such as the J75 or Conway are fitted; in these cases, the rudder boost may become a requirement in order to meet the one-engine-out case on take-off. I also made the point that the present method of locking and unlocking the parking brake required an unnecessary shifting of the feet to the very top of the foot-brake pedals in order to supply the strong physical forces required.

After lunch (during which the table-cloth got covered with graphs of $C_{L_{max}}$ lines and Mach numbers) I continued with Ray Chamberlain and others the discussion of details such as fuel-dump procedures, fuel contents gauges, ground clearance, relighting altitudes, holding-pattern heights, gust locks, fuel heating, vertical loads, gust criteria speeds, and so forth. I was then handed over to Mr. Dudley Nichols, and others whose names now escape me, in order to examine the structural details of the KC-135 now being built on the production lines. I was able to satisfy myself about various details of the multi-path constructional system and the machining of the integral wing fuel tank units. It was interesting to observe that, apart from the fore-and-aft shear web, fitted with spar caps, there is no main wing spar. A number of spanwise stringers take their place in carrying the primary bending loads. These and the very thick external skin carry about 75 per cent of the stresses.

I had queried the position which would arise relative to the bag tanks in the central wing area in the event of a wheels-up landing. After examining the immensely strong keel beam and after noting how much solid protection was given by the gear itself in the up position, I was almost convinced that, short of a catastrophic arrival, the centre-wing tanks would never be ruptured by any wheels-up landing. I also examined the main gear trunnion. This is placed aft of the rear shear web and *is not connected with it*. An auxiliary box unit with a form of fusible link is the only solid connection between the rear shear web, which is part of the outer casing of the wing tank, and the main gear attachments. Thus there seems to be little risk of the gear ever pushing its way

*"Boeing engineering has always been on the massive scale." Note that the Skydrol-filled hydraulic pipes are kept clear of the pressurized section of the 707's fuselage.*

## FLYING THE 707 . . .

through into the fuel tanks; instead, if treated badly, it will break off and disappear aft. Incidentally, this gear folds up into a very compact space sandwiched between the massive keel beam and the strong box section of the lower floor level.

Boeing engineering has always been on the massive scale and these aircraft indicate a continuation of this policy. There are many indications of great structural strength.

Another query of mine was to express concern that, in the event of a wheels-up landing, the pods carrying the engines would get mixed up with the fuel tanks. This subject has received a considerable study and Boeing have been able to profit from the experience of their military aircraft. A workable solution has emerged which has, I understand, proved itself in operation. Again fusible links are employed.

One ingenious feature of the aircraft is the arrangement whereby, when the cabin pressure falls below certain safety limits, the oxygen system available to both passengers and crew is automatically put into operation.

On Friday the 13th Ray Chamberlain picked me up as usual outside my hotel at 8.30 a.m. and, after clearing a few matters, he handed me over to Mr. W. Cook, engineer-aerodynamicist, who showed me around Boeing's vast 54,000 h.p. wind tunnel. This, it is claimed, is the largest privately owned wind tunnel in existence and it operates up to transonic speeds with models of 10ft wing span. Boeing stress the importance of the facility, which has enabled them to evaluate about 150 different wing shapes for their big jet aircraft. I observed, from one of the wall charts, that approximately 21,000 hours of test tunnel work had gone into their four major jets, the B-47 and B-52 having each required nearly 8,000 hours and the K-135 and the 707 absorbed the remainder.

Later we visited the plant where research was in progress designed to solve the noise-level problem. Here Boeing are pooling their experience with Rolls-Royce, though both concerns are carrying out independent programmes. In order to speed their work Boeing have simulated a jet orifice which realistically produces the required airflow, temperature, and noise-level, and I saw the various silencing attachments which had already been tested. With one such attachment, noise level had been reduced by as much as 40 decibels, but only at a considerable sacrifice to speed and manufacturing simplicity. Boeing have specified that the silencer they will ultimately fit will result in less than 2 per cent loss of thrust, and a compromise solution between engine thrust and maximum silencing is inevitable. To date, a loss of 15db can be achieved without overstepping the desired criteria. Those at work on this programme paid tribute to Mr. Greatrex of Rolls-Royce, whose nozzle is the basis of several successful experiments.

It is interesting to note that the Rolls-Royce Conway operates normally at about 6db less than the J75. Since, for the same thrust, it weighs about 1,500 pounds less per engine, the case for the Conway is a strong one. I also understand that the Bristol Olympus still further reduces this weight and is capable of similar amounts of thrust without noticeable increases in fuel consumption. Boeing are fully aware that, apart from the serious social problem of high noise-levels, there is an equally serious structural problem. At a considerable weight sacrifice they have thickened-up various flap and aileron sections in places where the metals are subjected to possibly dangerous noise-level effects.

The rest of the morning was taken up with various aerodynamic discussions regarding the control problems of high-speed aircraft. The placing of the spoilers so that they produce neither severe buffeting, nor changes in pitch, nor noticeable increases in stall speeds, is a classic example of what can be achieved by a comprehensive wind-tunnel test programme. The reversal of aileron effect at high speed is another such example.

Out for lunch, I took the opportunity to say goodbye to Mr. W. E. Beall and to Jack Steiner and spent an interesting half hour with the servicing department, who were examining the wreckage of the Northwest Stratocruiser which had just been raised from the sea-bed nearby. I also had an interesting discussion with Mr. Ralph Bell, director of sales, who had, *via* I.F.A.L.P.A., sponsored my visit.

It was with real regret that I said goodbye to Ray Chamberlain, who for three whole days had spared no pains to ensure that I saw what I wanted and got the answers to the questions in my mind. Apart from anything else, I would have got hopelessly lost in this huge plant, which is almost a city in itself. I believe that they employ about 9,000 engineers; and the goods they produce, as we all know, are contributing much to the security of the free world. I have no reason to doubt that the company's new embarkation into the civil field will be attended by success. They are making a most determined effort to stay in the civil market and to get on top. With this determination behind them and with their great military experience to back it up, it was gratifying to me to note with what favour they regarded the British jet engines. As has been announced, they are offering their customers a free choice of British or American engines, and they have now designated type numbers for the Rolls-Royce-powered aircraft. Who will be the first to order these aircraft, known as the 707-420 and 707-520, is anyone's guess, but that orders will be obtained I have little doubt.

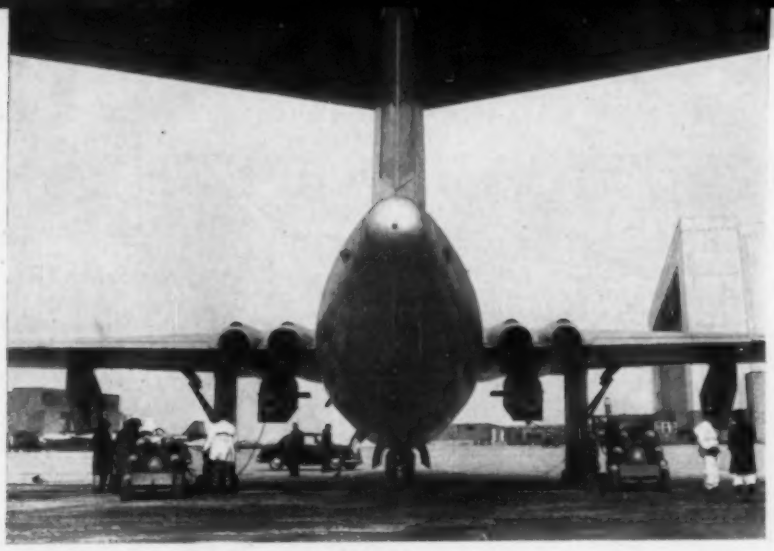
I had meant to take it easy on Saturday and get my notes up-to-date in preparation for the session I had arranged with Mr. Clarence N. Sayen, in Chicago, who, apart from being president of A.L.P.A., is also president of I.F.A.L.P.A. However, Bill Cook, who had previously shown me the wind tunnel and the noise-abatement laboratory, offered to show me the rest of Boeing's experimental test section. I gladly accepted this offer as, apart from anything else, I wanted to have another look at the prototype Dash Eighty. I had been so busy flying the aircraft that I had no opportunity to examine its other features.

One point I was able to satisfy myself upon is that, although the aircraft has a servo-tab control system, the controls *can* be checked for full movement on the ground. This apparent contradiction is due to the spring control. With no air loads to centralize the control of the servo-tab surfaces, initial movement of the control column moves the tab and further movement acts upon the control surface itself. A subsequent movement will then actuate the tab.

I also had a chance to make the proper examination of the flight engineer's panel. Details of this are not important, since in the production aircraft there has been considerable rearrangement of instrumentation. However, I did note that the fuel-diagram layout is essentially simple and that the auxiliary internal tip tanks and the centre wing area tanks operate in a manner which will not result in the aircraft being starved of fuel due to lack of watchfulness on the part of the flight engineer. I was also able to note that the use of direct A.C. power, generated *via* Sundstrand drives, has eliminated much of the complicated conversion of power which normally has to be accomplished. It is worth noting that these A.C. drives are protected against failure by malfunction indicators, overhead indicators and throw-out clutches, and by being given their own separate oil systems. I was also delighted to see that only the day before the Dash Eighty had been fitted up with Atkins collision-warning lights on both upper and lower lobes.

After leaving the aircraft, we toured acres of experimental and test departments. In these test laboratories, almost every conceivable aerodynamic condition can be simulated. A list of the laboratories would be over a page long. The importance of this is the understanding of the Boeing philosophy that a $5 million aircraft is only as strong as its weakest link. Thus, almost every component part which comes into the plant is subsequently re-tested in the company's own laboratories. These tests involve the use of cold chambers, heat chambers, salt-spray chambers,

(*Continued at foot of opposite page*)



*Installation of two D.H. Super Sprites in a Vickers Valiant (above). A mobile refuelling trolley carrying hydrogen peroxide, kerosine and nitrogen under pressure stands beside each main undercarriage leg. (Right) The Sprites in action; note the almost complete absence of smoke, an advantage of the liquid-propellant type of rocket motor.*

# SPRITELY VALIANTS

FIRING and dropping trials have been successfully carried out during the past year with de Havilland Super Sprite A.T.O. rocket motors installed in a Vickers-Armstrongs Valiant, and permission has now been given to reproduce these photographs, which for the first time illustrate the Super Sprite in its proper functional rôle. The motor, with its dropping container, has been developed specifically for the Valiant, and it was the first British liquid-propellant rocket motor to pass an official type-approval test. It is now in quantity production as the take-off aid for the Valiant, and all these aircraft now entering squadron service with the Royal Air Force have provision for its installation. As a result of flight experience, production versions of the dropping container now incorporate two stabilizing fins. These are employed to give the unit a nose-down pitching moment in the initial stages of dropping and so prevent the risk of collision damage to the aircraft structure. Super Sprite dimensions and performance have been known publicly for a considerable time. Basic motor length is 117¼in and diameter 20¼in. Empty weight is 620 lb, fuelled weight 1,460 lb. Standard thrust is 4,200 lb for 40 seconds duration; total impulse, 120,000 lb-sec. Propellants are 57 gal hydrogen peroxide at 80 to 85 per cent concentration and 5 gal kerosine. Feed is by 3,690 cu in nitrogen initially at 2,900 to 3,100 lb/sq in.

# SEEING IN THE DARK

AN optical amplifier that makes it possible for the human eye to see in the dark—or, at any rate, in nocturnal outdoor conditions—has been developed by Air Research and Development Command at the Wright Air Development Centre, Baltimore, Maryland. Known as Cat Eye, the system works on principles similar to those of television, though it is "approximately 1,000 times more sensitive" than a standard television camera. The cathode-tube image is said to be clear and sharp however dark the night. The U.S.A.F. sees a use for it in night reconnaissance work and, it is claimed, airborne observers have been able to see the ground clearly on a moonless winter night.

Development was begun 30 months ago and the pilot model has been successfully flight tested. Contracts for further development and improvement have now been awarded to Westinghouse and R.C.A.

In the Cat Eye equipment electro-magnetic waves (photons) are sensed and imaged on a photosensitive surface. They are transformed from photons to electrons, accelerated to produce electrostatic images, further amplified and sensed by an electron beam and finally amplified again on a cathode-ray tube. Work has been aimed primarily at producing a black-and-white picture, but scientists think Cat Eye could also be developed to produce colour pictures. Responsible for the new equipment are Dr. J. E. Clemens, chief of the Physics Branch, Aeronautical Research Laboratory, Wright Air Development Centre, Mr. R. H. V. Gebel, senior investigator of the project, Mr. Lake Croft and Dr. B. B. Johnstone.

## FLYING THE 707 (Continued from opposite page)

sunshine and rain chambers, and even chambers in which a highly combustible mixture of butane and air is held under pressure while parts are operated under working conditions at varying temperatures.

I also learned of the static tests which are a military requirement. One military model at some time early in the production line is virtually pounded to total destruction by the application of abnormal stresses. Another interesting section was one in which the sound level of 180db could be produced. With an eye to the future so-called heat barrier, many of the latest test sections were capable of producing very rapid rises in temperature. In the course of this tour of inspection, I also saw the vast water-test tank.

For those unfamiliar with the specifications of the 707, I feel that in justice to its advanced design I must mention, in conclusion, some of the features which appealed to me. These are:—

Airborne radar; SEL CAL; Skydrol 500 hydraulic system (with all electrical wiring made out of Skydrol-resistant materials); anti-skid brakes; isolated power shields; isolated radio compartment; thermal (second spool) engine and wing anti-icing; electrical tail unit anti-icing; emergency air brakes; free-fall emergency gear; indication of engine reverse to each engine; high gust-criteria speeds ($V_B$ 230 kt, $V_C$ 350 kt); circuit-breaker within reach of pilots; separate hydraulic motors for inboard and outboard flaps; total absence of gust locks; lateral control available with one flap section asymmetrical; automatic wheel-braking during retraction; dual gyrosyn compass systems; dual V.H.F., V.O.R., A.D.F., HZ-1, etc.; inspection panels to all wheels when down; static thrust indicators; inspection panels to cargo compartments; dual cables to all controls; hydraulic system limited to 3,000 lb/sq in; Nesa windows; underwing refuelling; tubeless tyres; two fuel booster pumps per engine on separate circuits; Freon fire extinguishing agent; emergency electric flap actuation; separate indicators to each of the four main flaps; flight engineer's panel within reach of pilots.

The only omissions of importance which occurred to me were:—

Boosted rudder; central landing light; vibration indicators attached to the engine mountings; firmer parking-brake lock; fuel heaters; larger engine instruments; space for let-down chart; crews' toilet (with up to 147 passengers on board, this could be quite a problem); limited turning circle; individual fresh air vents to crews' positions; hydraulic pumps to all engines instead of inboard engines.

Considering the balance between these two lists, and considering how essentially simple this aircraft is to operate and fly, the conclusion remaining is that in the 707 Boeing have launched a product which will, I feel, make an impact upon the industry such as no aircraft has made since the DC-3 twenty years ago.

# THE AERONAUTICAL BOOKSHELF

*"Across the High Frontier," by W. R. Lundgren. Victor Gollancz, Ltd., 14 Henrietta Street, London, W.C.2. Illustrated. Price 16s 6d.*

THIS is the biography of Major Charles "Chuck" Yeager, U.S.A.F., first man to fly faster than sound (in 1947) and holder of the unofficial "record" speed of 1,650 m.p.h., achieved six years later. It is also the first authoritative inside story of the entire X-1 project and, as such, cannot fail to become an aviation classic.

Perhaps the style of writing is not that which we associate with classics; but this is basically a book about an American for ordinary Americans to read and enjoy. Yeager's wife comes on the scene quite a lot, and so do his children, whose arrival always seemed imminent at awkward times. Yet this does not spoil the story, for "Chuck" Yeager is very much a family man at heart, and this partly explains the careful precision which is blended with courage and skill to make up his particular kind of flying.

There have been many descriptions of what happened during the high-speed tests of the Bell X-1 and X-1A. Now, here are the facts. The author, by adopting a simple, conversational style, lifts the reader out of his armchair into the B-29 as it climbs for height over Edwards Air Force Base, with the X-1 clasped in its bomb-bay, on October 14, 1947. We shudder as Yeager steps over 5,000ft of space from a rickety ladder into the X-1's open door, sweat with him as the next 20 minutes drag on, through endless cockpit checks to the final "five—four—three—two—one—Drop!"

Then, the sudden glare of blinding sunlight after the dark of the bomb-bay, a slam in the back as the barrels of the rocket-motor fire one by one, a buffeting at Mach 0.87 when the right wing drops, followed by loss of elevator and rudder effectiveness and a nose-down trim change. On to Mach 0.9 and the trim change is reversed to nose up. Buffeting becomes more severe. We feel grateful that we were not in that tiny cockpit when Yeager finally opened up all four rocket-barrels for the first time and headed for what the newspapers had christened the "sound barrier" when pilot after pilot died in battle with the shock-waves.

Far more frightening is Lundgren's account of the 1,650 m.p.h. flight, when the X-1A went out of control at 70,000ft and tumbled ten miles in 51 seconds, with Yeager blacked out and helpless inside it, without even an ejection seat.

Today, if you ask "Chuck" Yeager his opinion of the X-1 he will describe it as "a real honest aeroplane"—one that never let him down. Perhaps that is why pilot and aeroplane made such a good team, for this modest, sincere young man from the hills of West Virginia has not let down the U.S.A.F. by becoming swell-headed now that his is one of the great names of powered flight.

*"The Sky My Kingdom," by Hanna Reitsch. The Bodley Head, 28 Little Russell Street, London, W.C.1. Illustrated. Price 12s 6d.*

AS a child of 13, Hanna Reitsch's ambition was to be a flying missionary doctor. Instead, 17 years later she was a test pilot, struggling to perfect rocket-powered fighters and flying bombs, and so caught up in the web of war and Nazi propaganda that her main hope was to kill and be killed in a suicide bombing operation against Allied military targets.

The transformation is frightening, and so were some of Frln. Reitsch's experiences. Like many Germans, she began flying in sailplanes and one of the finest pieces of descriptive writing in her book tells of the first time she nosed a Grunau Baby training glider into a cu-nim. First hint of danger was a swift hailstorm: "a million drum-sticks suddenly descended on the glider's wings, and started up, in frenzied staccato, an ear-splitting, hellish tattoo." At 9,750ft her instruments iced up and, with too little experience and no horizon, she could not prevent the Baby stalling and whipping over into an inverted dive.

Even the mica cockpit cover was coated with ice; so she smashed a hole in it. Unable to control the glider, she released the stick, too cold, wet and terrified to worry any longer if it broke up in the icy gales that wrenched at its wings, slamming her from side to side of the cockpit. Left to its own devices, it flew out of the cloud, upside down and with countless holes in the wings, but controllable in the smooth air.

She became in time so skilled a glider pilot that she represented Germany in international competitions, set up world records, became one of the first group of pilots to cross the Alps in a motor-less aircraft, and began flight testing new designs, including the unique Sea Eagle flying-boat glider. And in 1937 she was ordered to Rechlin as a military test pilot, imbued with Nazi doctrine and seeing the rows of Stukas as "guardians at the portals of Peace."

There followed her much-publicized indoor flights in the Focke-Wulf FW-61 helicopter, as an interlude in a variety programme, sandwiched between dancing girls and clowns. But more serious work lay ahead: her next glider flights were aimed at perfecting troop-carrying gliders and a method of landing gliders and light liaison aircraft on parallel ropes stretched 20ft above the ground in areas where normal landings were impossible.

The prejudice against women test pilots was gradually overcome by her courage and skill, and by the fact that her small size enabled her to fly in cockpits too cramped for other pilots. So, she was able to flight test the tiny gliders intended for towing behind parent aircraft as pilotless tankers for in-flight refuelling. With locked controls, she had to test their stability; but they had none, and were quickly abandoned.

Even more dangerous were flights into balloon-cables to perfect cable-cutters, tests of piloted V1s and Me163 rocket fighters, one of which stalled, crashed and nearly killed her, thereby earning her the Iron Cross, First Class. *The Sky My Kingdom* leaves little doubt that she deserved the highest honours her country could give her.

*"World Aircraft Recognition Manual," by C. H. Gibbs-Smith and L. E. Bradford. Putnam and Company, Ltd., 42 Great Russell Street, London, W.C.1. Fully illustrated. Price 15s.*

SUPERSEDING Mr. Gibbs-Smith's earlier pocket-size *Aircraft Recognition Manual*, this new book is one of the few which sets out to teach its readers *how* to recognize aeroplanes. It does this in only seven pages at the front, but the author's familiar style of likening, for example, the nose of the Skyray to a snake's head and the fuselage of the B-36 to a reincarnated Zeppelin supplements these pages and may well help to make the various shapes stick in the minds of less-knowledgeable readers. It certainly makes the book entertaining.

The larger size and different shape of this new book have eliminated several shortcomings of its predecessor, and it is unfortunate that the economy has compelled retention of some of the original small illustrations. Often, the old silhouettes are so small as to be useless, especially as they show the plan view from above instead of an underneath "spotter's" view. The new, larger four-view silhouettes by Mr. Bradford are much better and, when the older illustrations are all rejected through obsolescence in a few years' time, the present patchy layout of the book will be greatly improved.

Altogether some 240 aircraft are described and illustrated with a commendable standard of accuracy. The selection might have been improved by putting in the Il.28, Friendship, Rapide, Proctor, Tiger Moth and Hermes at the expense of the Athena, Skyvan, Noroit, Salmon and Auster B.4; but no two persons would ever agree entirely the list of aircraft to be included in a book of this type and, in general, the choice is sound.

## OTHER BOOKS RECEIVED

*There is Life on Mars*, by the Earl Nelson, F.R.A.S., F.R.G.S., F.R.S.A. T. Werner Laurie, Ltd., 1, Doughty Street, London, W.C.1. Price 12s 6d.

*Qantas Aeriana*, by E. A. Crome. Francis J. Field, Ltd., Sutton Coldfield. Price 20s.

*An Introduction to the Theory of Aeroelasticity*, by Y. C. Fung. Chapman and Hall, 37, Essex Street, London, W.C.2. Price 84s.

*Supersonic Aircraft*, by Roy Cross. Macdonald and Co. (Publishers), Ltd., 16, Maddox Street, London, W.1. Price 6s 6d.

*World Airline Record*, published by Roadcap and Associates, 327, LaSalle Street, Chicago 4, Illinois, U.S.A. Price $17.50.

*Modern Petrol Engines*, 2nd Edition revised, by Arthur W. Judge, A.R.C.S., D.I.C., Wh.Sc., A.M.I.Mech.E., A.M.I.A.E. Chapman and Hall, 37, Essex Street, London, W.C.2. Price 56s.

*Tables of the Cumulative Binomial Probability Distribution*, by the staff of the Computation Laboratory, Harvard University. Harvard University Press—Cumberlege, Amen House, Warwick Square, London, E.C.4. Price 63s.

*Six Great Aviators*, by John Pudney. Hamish Hamilton, Ltd., 90, Great Russell Street, London, W.C.1. Price 10s 6d.

*World Oilmen*, text by A. M. Melland, Ph.D., A.R.C.S., B.Sc. Sylvan Press, Ltd., 24, Museum Street, London, W.C.1. Price 42s.

*The Engineer Buyers Guide, 1956. The Engineer*, 28 Essex Street, London, W.C.2. Price 7s 6d.

*The Royal Air Force Medical Services, Vol. II, Commands.* Edited by S.C. Rexford-Welch. Director of Publications (P), H.M. Stationery Office, Atlantic House, Holborn Viaduct, London, E.C.1. Price 75s.

*The Lonely Sky*, by William Bridgeman. Cassell and Co., Ltd., 37-38, St. Andrew's Hill, London, E.C.4. Price 16s.

*Boundary Layer Effects in Aerodynamics*—Proceedings of Symposium held at the N.P.L. in 1955. H.M. Stationery Office for Department of Scientific and Industrial Research, Charles House, 5-11, Regent Street, London, S.W.1. Price £1 10s 0d.

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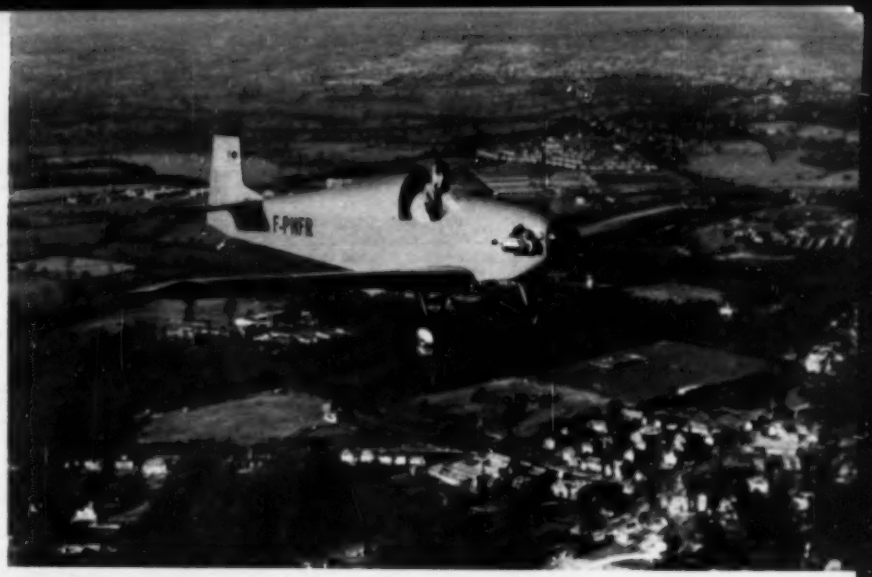
# SMOOTHLY TURBULENT

## *Reflections on the Recent British Tour of the Druine Ultra-light*




*Cruising at 75 m.p.h. on under two gallons an hour—the author in the Turbulent during the tour described in this article.*

**INTEREST in amateur-built ultra-light aircraft was recently stimulated in this country by the visit of Druine Turbulent F-PHFR to many clubs and light-aircraft groups. During this tour the Turbulent was piloted by Mr. Harold Best-Devereux, a senior surveyor of the Air Registration Board and a committee member of the Popular Flying Association, who gives in this article his personal impressions of the French aircraft's visit to England.**

WHY Roger Druine, the designer of the little French single-seater, named it as he did is truly a mystery. Perhaps it is due to the rather infectious sprightliness of the type, which always gives the impression of chafing at the bit and being eager to go. This spirit is accentuated by the feeling of riding through the air rather than flying. Certainly, following a month's operation, this feeling is firmly implanted in the mind of one fortunate pilot.

For a long time, since sampling the type in France on several occasions, the Popular Flying Association had been trying to lay hands on an example to show in England, on the basis that an aircraft in the flesh is many times more interesting than all the brochures and pictures in the world. A kindly offer of an almost new Turbulent from the Druine stable was not to be missed and, following an official invitation from the P.F.A. to the owner, the French authorities generously granted special permission for the aircraft to leave France, although flying on a French ultra-light C. of A.

Thanks to the efforts of an Elstree Flying Club member, Mr. C. Croxson, speedy transport to collect the Turbulent was provided by his cabin Moth Minor—which suddenly appeared to be ridiculously large when, on arrival at Villacoublay, it was parked beside the diminutive jade-green single-seater. Here Roger Druine was carrying out a daily inspection with as much apparent concern as though the aircraft were going on a local flight rather than a month's holiday. The brisk way in which the tiny Volkswagen flat four started up inspired immediate confidence, and M. Druine's casual "Au revoir—be back in a month" certainly showed his belief in the ability of his brain-child.

The sensation of flying the Turbulent away from the airfield in a cloudless early morning sky past the gardens of the Versailles palace inspired a delightful *joie de vivre* and the journey to Beauvais to collect some fuel could not have been bettered in the most expensive aeroplane ever built.

The flight between Beauvais and Le Touquet enabled careful speed measurements to be made, and increased the delightfully intimate feeling of flying an ultra-light single-seater—an impression which remained throughout the tour. Near Poix airfield a running fight along the main road with a sports car was very satisfying, particularly when it was realized that the car was a Porsche. This must have been about the first time that a Volkswagen had pulled away from its more sporty brother.

Whilst appreciating that the single-seater would not satisfy all tastes, there is certainly a "something" which grows on one and is truly enchanting. Talking to oneself, for example, no longer seems the first stage of madness, and the shouting of imprecations at various people and things on the ground can be almost intoxicating.

The first surprise in operating the Turbulent was that on 28 b.h.p. the cruising speed was an honest 75 m.p.h.; and this fact, coupled with the use of winds to the best advantage, enabled very reasonable cross-country performance to be attained.

The second was the ability of the aircraft to fly cross-country as well as, if not better than, some of its bigger contemporaries of much greater horsepower. The stability and steadiness certainly inspired confidence, particularly when one has learned that heavy hands are not necessary. The controls are delightfully light and sensitive and there is no doubt that pilots flying the type will certainly develop and maintain a proper co-ordination which will not be wasted when flying larger types. This particular feature seems to be most useful for the impecunious student trying to pile up hours for a commercial licence. So often in the past the ultra-light aircraft has had the control characteristics of a Thames barge.

For many years the greatest difficulty for the ultra-light enthusiast has been that of finding a motor giving any sort of reliable performance, and there is little doubt that this one drawback of ultra-light activity has delayed the proper use of these aircraft for some 25 years. By a stroke of good fortune the Volkswagen car engine seems to meet the bill excellently, being of the popular flat-four air-cooled layout, and in the Turbulent being fitted with a duplex magneto giving two sparks per cylinder. Instead of being hotted up for aircraft use it is if anything somewhat "cooled down," and thus reliability of a high order is coupled with a long between-overhaul life of something like 800 hours.

During some 40 hours of the Turbulent's peregrinations in England the motor ran on sewing-machine lines at slightly less than two gallons of fuel per hour, while the total oil consumption throughout the tour barely exceeded one pint. Such was the smoothness of the motor that the two crossings of the English Channel gave few qualms except that in the middle the feeling was certainly akin to that of being an elephant sitting in a matchbox. Changing over to another aircraft such as, for example, a B.A. Swallow, seems for a few minutes like flying a Dakota.

There was no doubt that the arrival of the aircraft in England created more than a usual stir, and the reception on landing at Elstree was really amazing. The P.F.A. certainly has reason to be pleased at the amount of interest shown by all sorts of people on this occasion. It is obvious that, once started, the amateur movement can produce and fly aircraft which will give safe flying at cheap rates, while helping to rejuvenate moribund sporting-aviation interests by bringing in more members to groups and clubs who otherwise would be unable to afford to fly bigger and more powerful types. Naturally it is not assumed that the ultra-light would replace the present light-aircraft types, but, as something complementary to present fleets, it can certainly do a most useful job.

A particularly useful and educational facet shows up when flying the Turbulent—one which is likely to be overlooked in larger aircraft where the pilot is inclined to ignore the surrounding atmosphere: a few flights across country in the aircraft soon brought home points of pure flying which, if not rusty, were perhaps a little tarnished. The use of cloud streets and hill ridges undoubtedly add a spice to cross-country work, while there is a smug satisfaction in having bumped up the ground speed while reducing the already low fuel-costs. The values of such basic activities as flying high with the wind, and low against, show up as high percentages and certainly encourage an attention to cruise control not normally used by light-aircraft pilots. By using the wind to advantage coupled with hill lift from the Pennines it was possible, for example, to fly from Barton to Derby in 35 minutes, giving a ground-speed of about 88 m.p.h. Additionally, the full use of controls paid dividends in successful taxying in winds of up to 25 kt. Naturally it was not expected to operate regularly at such a wind-speed, particularly for student pilots. In winds of from 15 to 18 kt, however, no difficulty was experienced; and, while in certain conditions the Turbulent lived up to its name, there was a satisfying controllability in the air once the aircraft was allowed to ride the bumps. Flying in bad visibility was ex-

## SMOOTHLY TURBULENT . . .

ceptional and the ability to potter along at 45 m.p.h. was very satisfying.

In all, some 23 airfields were visited during the Turbulent's U.K. tour, and the aircraft was sampled by more than 25 pilots, including Pat Fillingham, Hugh Kendall, Ian Forbes, George Miles, two A.R.B. pilots and Ranald Porteous. All who flew the aircraft commented most favourably on its controls and performance. Three pilots would have preferred slightly more fin while others felt that the geometry of the brake pedals could be improved. All who stalled it remarked on its excellent stalling characteristics and none seemed to find the lack of aerodynamic warning anything to bother about, the loss of height being so small. Several were experienced test pilots, and their comments were especially valuable in that the initial tests carried out by the P.F.A. were more than justified.

Pottering around the clubs and groups certainly gave an insight into the present state of club aviation as it is at present. The variety of standards and angles of view is limitless, but one unanimous point which stands out is the amount of interest in a new type. It would not have mattered whether the aircraft was the Turbulent or anything else, for the interest is there. It seems amazing that nobody will get in and produce a sensible little British light aeroplane on modern lines.

In comparison with Continental air touring it is easy to note at British airfields the number of people without whom aviation would surely die—at least, that is their own personal opinion. It is amazing how so many people can be so important in such a small aviation sphere as we have in the United Kingdom. This is not peculiar to any class of airfield. Elmdon, for example, was an excellent example of co-operation and friendliness, so one cannot always blame State aerodromes. One airfield insisted on charging five shillings for the arrival plus five shillings for each of two local flights by club instructors, a charge which handsomely exceeded the cost of fuel for that trip. Another well-known club field has an individual who stuffs an indemnity form under one's nose immediately on landing and insists on such a form being signed for each local flight. To a point these things can be laughed off; but when one remembers the freedom of pre-war private flying, it is easy to see why otherwise successful and normal people find trying to fly about the country for business or pleasure a pain in the neck from the moment the engine is stopped.

The "prior permission only" game is one of the worst in point. Presumably this restriction gives the aerodrome owner some legal protection, but how much better if the *Air Pilot* listed such aerodromes as "own risk only". To fly from Denham to White Waltham on a Sunday, for example, needed 15 minutes' flying—compared with over an hour on the telephone trying to raise someone interested enough to give permission to land.

During the Turbulent's tour the occasional necessity to assume the epidermis of a rhino in order to deal with such things was far outweighed by the many healthy signs and friendliness of certain clubs and groups who make flying their No. 1 activity. The Armstrong Siddeley Club at Baginton, the Lancashire Aero Club at Barton and the Northamptonshire Aero Club at Sywell were particularly well worth visiting.

Although the aircraft was flown around on a spare-time basis the advertised schedule was more or less maintained. Such was the demand for visits, however, that some groups, regretfully, had to be left out. Owing to a slight mishap which damaged the airscrew at Filton, it was not possible to have the aircraft at Croydon for as long as had been hoped. In fact, the Croydon visit had to be restricted to Customs clearance before leaving for Toussus le Noble, which was reached in one hop in 3½ hours—using just over seven gallons of fuel at duty-free rates. London to Paris for fifteen shillings could not be equalled with a bike!

In passing it might be mentioned that in spite of the droves of people who descended on the Turbulent not a scratch was found, although the ability of small boys and not-so-small boys to leave neat rows of finger-marks was very apparent. Great interest was shown in the engine installation, while the chromium-plated undercarriage with its scooter wheels and brakes aroused wide comment.

Several lessons in the operation of ultra-light aircraft were learned. Taking off from small fields was greatly simplified by the handiness of the type, which enabled miniature circuits to be flown inside the airfield boundary if one so wished. This feature gave a secure feeling at airfields with heavily built up perimeters. Forced landings are possible in the smallest fields and with the Turbulent's good sideslip characteristics one would have to be very unlucky to suffer damage in such circumstances. The point to guard against—as with all aircraft, of course—would be the danger of an unskilled pilot taking off again from a small field. Approach and landing at busy airfields involves a slight variation from normal and it was found better to fly the circuit at normal cruising speed, reducing speed only on the final glide. In this way loitering on a busy circuit is reduced.

As a lesson of the visit of this little aircraft it is obvious that light-aviation interest has not died in this country. The young are intensely interested in getting something going and it would be unfair not to mention the behind-the-scenes help and support from some of the older enthusiasts who, without thought of credit, helped the tour in so many practical ways.

H. B-D.

## THOSE AMERICAN MERGERS

THE Detroit correspondent of *The Autocar*, Roger Huntington, has made some interesting observations on big business in the American car and aviation world. Asking whether the day of the 100,000-unit-a-year manufacturer is a thing of the past in the car industry, and observing that the Government sees the small automobile-manufacturers as invaluable heavy defence facilities which could be readily converted to the production of guns, tanks and jet engines, he outlines the current Curtiss-Wright-Studebaker-Packard negotiations as follows:—

"In an unprecedented move, top officials of the Eisenhower administration have recently sent out work to all executive departments to co-operate in every way possible to preserve the Studebaker-Packard manufacturing resources for defense needs. (Their situation is much more critical right now than that of American Motors.) The Government action is largely a result of the personal efforts of Defense Secretary C. E. Wilson, who was formerly G.M. president (!) and who is well aware of the production potentialities of an automobile factory. The Government's 'artillery' in this case, of course, is the lucrative defense production contract—everything from jet engines and guided missiles to Army trucks could be involved. With a little manipulation here and there the Government could really soak up 100 per cent of the S-P facilities, and put them back in the black in no time.

"The big stumbling block right now is *cash*. S-P president James Nance says he needs $50 million before he can make a move in *any* direction. His credit isn't good enough to *borrow* it—and, far as that goes, he owes $25 million now, and the creditors are starting to get a little impatient. A merger with another large corporation looks like the only answer.

"That corporation will very likely be Curtiss-Wright. They're a profitable, fast-growing outfit, one of our largest builders of aircraft engines (both piston and jet), and they are anxious to diversify their operations as well as expand production facilities. It looks like a perfect marriage . . . but only when you consider the tax gimmick that makes it all possible.

"That is, it would seem sheer folly for a going concern to pay millions for a company that's losing money right along, and with a large debt hanging over it. But here's the deal: S-P has lost some $69 million in the last 2½ years. This loss can be 'carried forward' and deducted from future taxable profit. Since our current annual tax rate on large corporations is 52 per cent of the net profit, this tax loss carry-forward would actually be worth $36 million *in cash* to any outfit that bought control of S-P, deductible over a period of four years! That's enough money to buy control of S-P these days.

"So here's how the situation stands as this is written: Nance needs $50 million additional capital to keep going. A group of bankers have offered to loan $15 million—and present creditors have offered to postpone payments—*if* he can get $35 million out of Curtiss-Wright on a merger deal. (Nance can sell control of his corporation, since well under half of the authorized stock issue is now outstanding.) Curtiss-Wright, in turn, have made the merger deal conditional upon definite defense contract commitments from Washington totalling at least $200 million. I understand these negotiations have been wrapped up now—and we're waiting for the announcement of the Curtiss-Wright-Studebaker-Packard merger momentarily."

## G/C. C. R. J. RANDALL

WE regret to record the death of G/C. C. R. J. Randall, one of the pioneers of the Naval airship, as the result of an accident in Guernsey, where he had lived since his retirement. Born in 1870, he was appointed, as a Naval officer, to No. 1 Naval airship in 1911 and received his pilot's certificate in 1912. For the ensuing twelve months he instructed at the Central Flying School, Upavon, and in 1914 was appointed to the airship sub-committee of the Committee of Imperial Defence. With these duties he combined those of Admiralty overseer in charge of the building of No. 9 rigid airship. G/C. Randall served in France and Malta during the First World War. He was commissioned in the R.A.F. in 1918 and retired in 1923.

*Seen at Bovingdon some weeks ago was a Bristol Freighter Mk. 31 (left) of the Royal Iraqi Air Force. It had come over to Leavesden for a load of spares. Formerly it was registered G-AMRO. The helicopter is a Kaman HOK-1 with the new "bear-paw" landing gear, developed for operations involving landing on, or taking off from, snow, mud or sand.*

# AIRCRAFT INTELLIGENCE

## U.S.A.

*Convair B-58 Hustler.* It is reported by *Aviation Week* that one mission of this supersonic bomber will be to act as a mother ship for pilotless intercepters, two types of which will bear the names Duck and Goose.

*McDonnell F-101B Voodoo.* This intercepter version of the Voodoo will carry a radar operator in additio to the pilot. The nose will be correspondingly lengthened.

*Ryan Vertiplane.* The Ryan "Vertiplane", illustrated in *Flight* last week, will be developed with the aid of a research machine having a single Lycoming XT53-L-1 turboprop rated at 825 s.h.p. Full-span double flaps will achieve 90-deg slipstream deflection.

*Piper PA-24 Comanche.* Illustrated in our previous issue was this new single-engined, four-seat all-metal business aircraft. The first flight was on May 23 and preliminary tests give hope of a cruising speed of about 160 m.p.h. Large-scale production is planned for the spring of 1957. The high-aspect wing uses a N.A.C.A. laminar-flow aerofoil section.

## France

*S.E.210 Caravelle.* In the course of route-proving trials the Caravelle was recently flown from Paris to Algiers. The outward flight was made with both Rolls-Royce Avons working and took 2 hr 7 min. The return flight—of 3 hr 13 min duration—was made with one Avon shut down, at a height of 19,700ft. During single-engine take-off trials at Toulouse, at an all-up weight of 33 metric tons, the Caravelle left the ground after a run of less than 6,560ft.

*Wassmer 20 Javelot.* The Javelot is a new glider which is now being assembled for demonstration during the world gliding championships at St. Yan from June 29 to July 13.

*Hurel-Dubois Progress.* On completion of the Flight Test Centre trials of the H.D.321, the three prototypes had accumulated a total of 1,200 flying hours within the scheduled period. As a result of special tests the National Geographical Institute has expressed its intention to place an order for six. Production of the H.D.321 is well under way and the first should be delivered in February 1957.

*S.O.1221 Djinn.* The first Djinn helicopters built entirely in the S.N.C.A.S.O. plant at Rochefort were test-flown on June 4. (The 28 pre-production machines now flying were built at the Courbevoie works.) Production rate at Rochefort will increase rapidly in order to satisfy the priority orders on behalf of the French Army in North Africa as well as a number of contracts placed by foreign governments.

## Poland

*L.W.D. Zuraw.* Intended for operation from unprepared ground, the Zuraw I made its first flight in May, 1951. A high-wing, strut-braced, 2/3-seat cabin monoplane, it was of composite construction, the fuselage being of welded steel tubes. The engine was a 160 h.p. Russian M-11FR air-cooled five-cylinder radial, but with this it was underpowered and no production resulted. The Zuraw I was the last design of Lotnicze Warsztaty Doswiadczalne (Aircraft Construction Research Centre) before its liquidation. After a so-called "reorganization of the aircraft industry" interest in the type has been revived and design work is now in progress on a new version—the Zuraw II—intended for glider towing and having a 300 h.p. engine. Maximum speed should be 164 m.p.h.

**NORTHROP SM-62 SNARK**
**(Allison J71-A-3)**

| | | | | | |
|---|---|---|---|---|---|
| Span | ... | ... | ... | ... | 42ft |
| Length | ... | ... | ... | ... | 74ft |

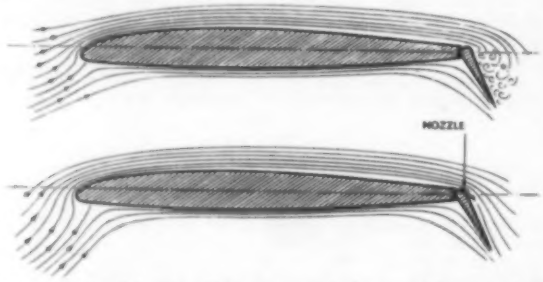
# "FLAP-BLOWN" D.H. SEA VENOM

## *Successful Carrier Trials With a Mk 21*

***A Mk 21 Sea Venom with flap-blowing is launched from the steam catapult of H.M.S. "Ark Royal." As a type, this aircraft does not need lift-augmentation, but, being established in carrier service, it offered itself as a convenient test bed.***

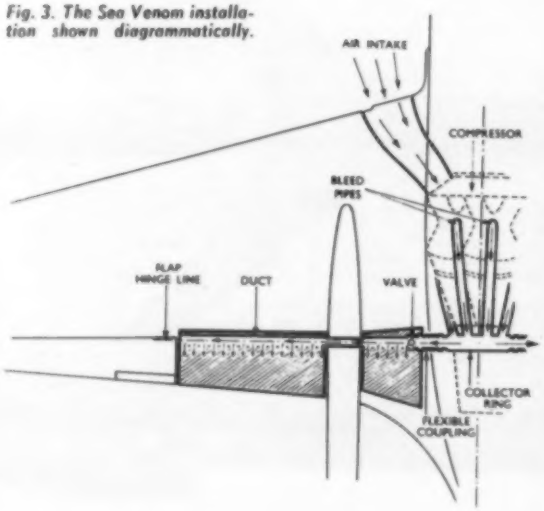
TWO accepted methods of increasing the lift of a wing, by raising its area or augmenting the maximum lift coefficient, both involve problems. The former can be incorporated only at some sacrifice of aircraft performance in other departments, notably its capacity for high-speed flight. In the second case the $C_{L\,max}$ is usually limited at a fairly low value in view of the thin-wing and swept-wing requirements at transonic and supersonic speeds. The drooped leading-edge has been successfully employed, but it is probable that not much more can be done to the aerofoil section without detriment to high-speed characteristics. An effective method, therefore, of increasing the lift coefficient of a wing under critical low-speed conditions is to set about improving flap efficiency.

In Fig. 1, the airflow characteristics of a wing at zero incidence and with a conventional flap extended are clearly demonstrated. It will be noticed that the point at which the airflow separates from the aerofoil is very close to the hinge-line of the flap. Fig. 2 shows the result obtained from the same wing at the same incidence when a jet of air is ejected at high velocity from the point of separation. In this case the layer of air next to the surface has been re-energized and separation has been prevented. A much larger amount of the air flowing over the top surface of the flap is now deflected down by it and thus the amount of lift is increased.




***Figs. 1 and 2 (above). Airflow at zero incidence with conventional flap extended; and in similar circumstances but with flap-blowing.***

***Fig. 3. The Sea Venom installation shown diagrammatically.***




The effectiveness of this method of increasing flap efficiency and, therefore, lift has been known for some years. But the power required to produce the auxiliary flow was large enough to render the idea impracticable in the days of piston-engined aircraft. It was not until the advent of the gas turbine, with its readily available supply of compressed air, that interest was revived.

In order to explore the advantages of this system and to gather knowledge under practical working conditions the de Havilland Aircraft and Engine Companies, on behalf of the Ministry of Supply, undertook a design study in 1954. From the aircraft point of view the work was mainly concentrated on wind-tunnel experiments to corroborate the estimates and establish the optimum position for the discharge nozzle. On the powerplant side a standard Ghost 104 engine was modified to give the air supply required. This engine has been equipped with an automatic regulator which limits the maximum r.p.m. to prevent the turbine overheating at full throttle.

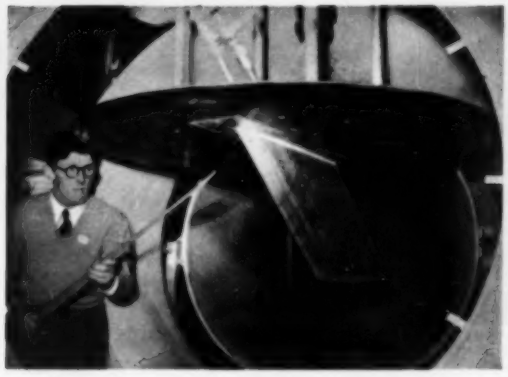
To gain air experience with this installation it was decided to modify an actual aircraft and subject it to a rigorous flight-test programme which included dummy deck-landings, overshoots and accelerated take-offs from a ground-installed steam catapult located at the R.A.E. airfield at Bedford. So that carrier trials could follow, it was logical to choose for this task a de Havilland Sea Venom Mk 21.

Fig. 3 diagrammatically illustrates the modifications which have been carried out to both engine and airframe to install a system that has become generally known as "flap-blowing." At the same time, the Venom wings were equipped with drooped leading-edges. It will be seen from one of the accompanying photographs that the flap dimensions have been considerably increased both in chord and span, the dive-brakes of the standard aircraft having been removed to accommodate the larger flap. The photograph shows the discharge nozzle which, in the form of a slot, is positioned close to the hinge-line and runs along the entire span of the flap. The air supply is tapped from the Ghost compressor by the bleed-pipes shown in Fig. 3 and is then led to a collector-ring, whence it passes by way of a flexible coupling into the body of the flap, finally leaving the convergent discharge nozzle at sonic speed.

This was the first occasion on which a British aircraft employing this new feature had flown from a carrier.

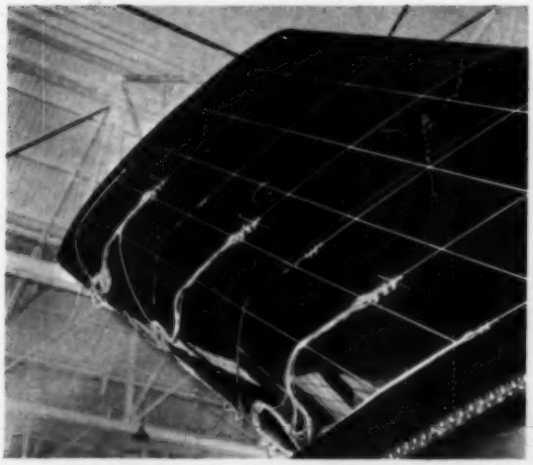
***This close-up view of the starboard flap of the modified Sea Venom shows the slot from which the high-velocity air jet emerges. The flap is of larger-than-standard span and chord. The marks seen adjacent to the slot are made by temperature-sensitive paint.***

*Work in progress in the Aerodynamics Department wind tunnels. (Left) A demonstration of aileron flutter for the benefit of visitors. (Below) A student, who is doing a thesis on boundary layers over swept wings, studies a wing section.*

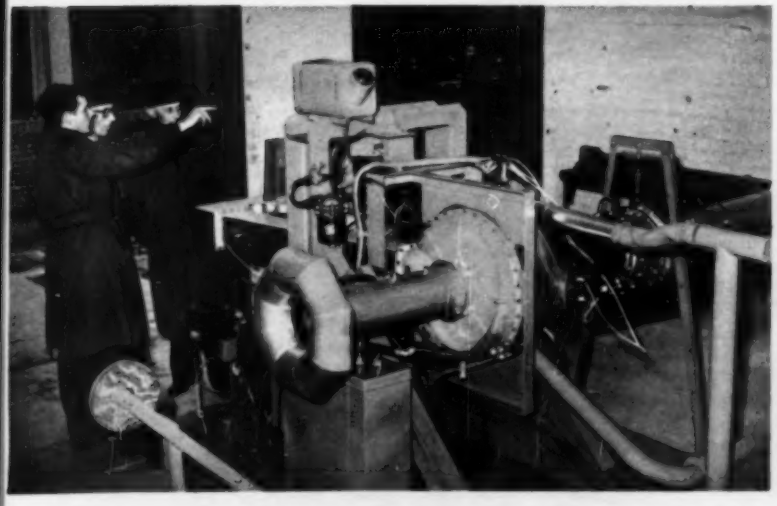


# Cranfield Shows its Work

*Some "Flight" Pictures of the Recent Open Days*



*Exterior and interior: on the left a close-up of the vertically-mounted swept wing, for boundary-layer research, on the M.o.S. Lancaster. "Combs" on the wing section are connected to a battery of manometer tubes, seen in the right-hand picture; readings are recorded on the modified F.24 camera in front of the tubes.*

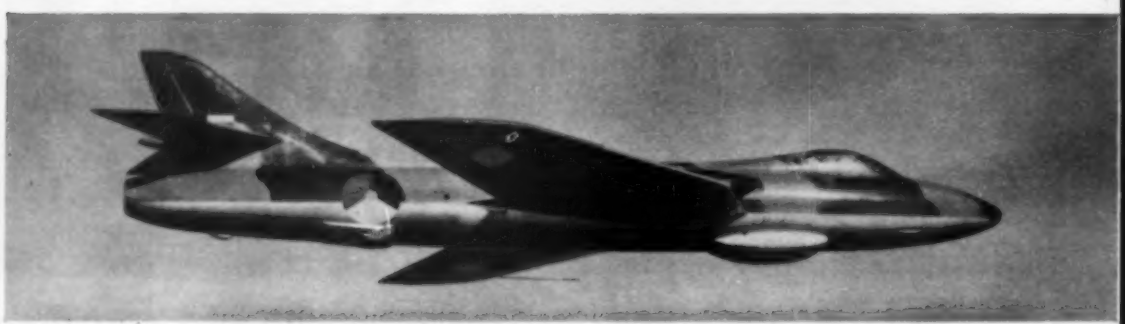


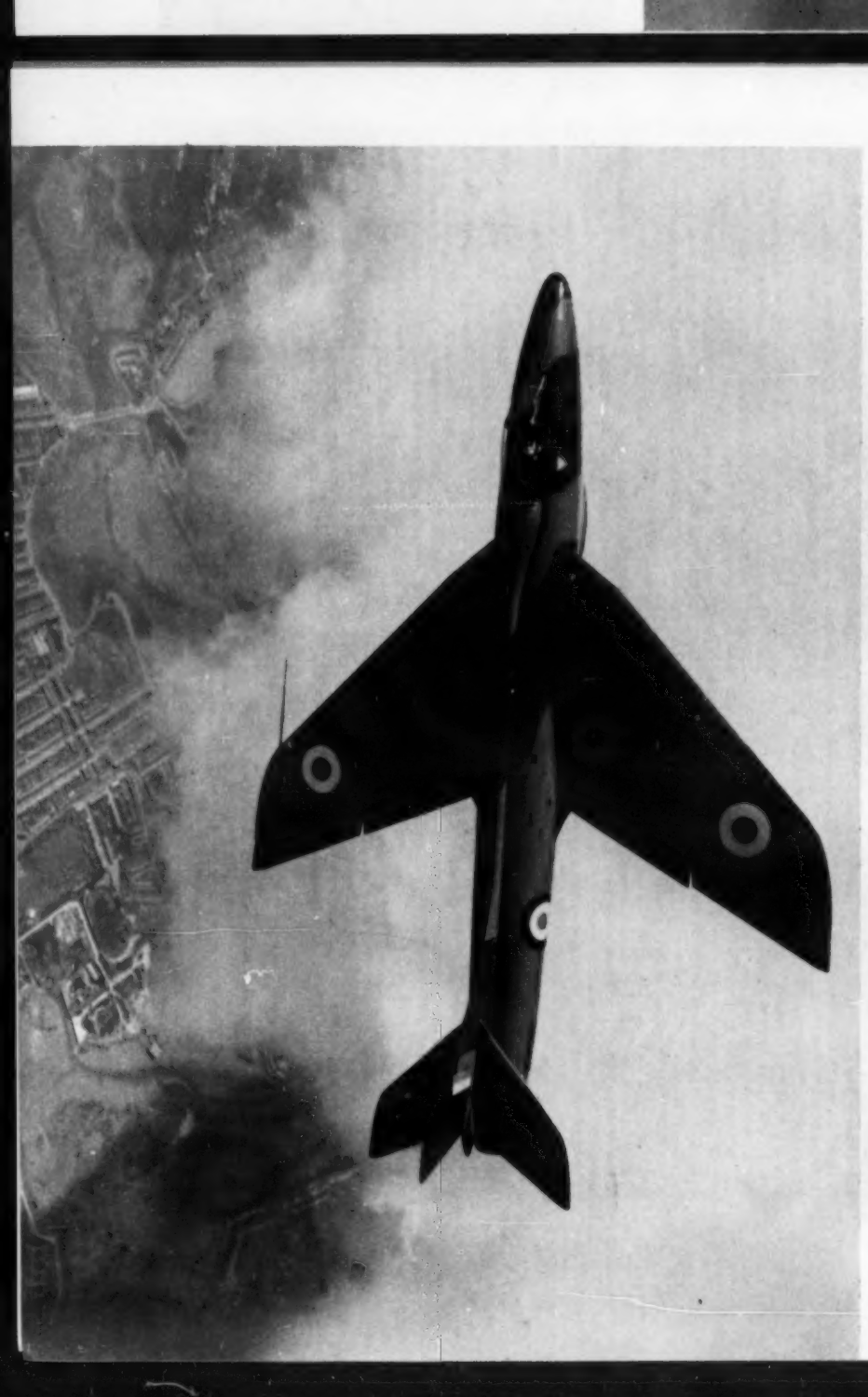
*A General Electric turbosupercharger (left) fitted to a Derwent combustion chamber to convert it to a self-sustaining turbojet unit of low output. (Below) Jet-relighting is demonstrated with a rig incorporating a part-sectioned combustion chamber.*

# FULL CRY

## *Hunters at the Gallop*

AT a recent conference in Bonn the Commander, 2nd A.T.A.F., said that his Hunter squadrons had been having "great success" in their air-to-air gunnery practice; and it is not in respect of armament alone that the sleek Hawker single-seaters are meriting praise. Nor are their qualities an R.A.F. monopoly, for the type is already serving, or is on order for, the air forces of Holland, Belgium, Denmark, Sweden and Peru. The new picture below shows a Hunter F.4 in the colours of the Royal Netherlands Air Force; at upper left is a Hunter of the same mark bearing the insignia of No. 98 Squadron, R.A.F., and at upper right another F.4, in this instance of No. 118 Squadron. The aerobatic flight (again on Hunter F.4s) inverted at the foot of the page is that of No. 93 Squadron; and seen in obverse and reverse on the opposite page is a production Hunter F.6, with uprated Rolls-Royce Avon. Hunters of this mark are now entering R.A.F. service.





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# A.S.T.'s QUARTER CENTURY

## *A "University of the Air" —and an Aircraft Factory*

*Helicopter training—given on two Hillers—is an important branch of A.S.T.'s work: R.A.F. and Army pupils are trained.*

"Flight" photograph

STATISTICALLY, Air Service Training, Ltd., is one of the smaller members of the great Hawker Siddeley Group, with under 2,000 employees; but few companies are engaged on such a variety of aviation activities. On the north side of a winding road at Hamble in Hampshire is the A.S.T. "University of the Air," which has trained men from over 70 countries to service and fly aeroplanes to the highest standards of efficiency and safety. On the other side is the A.S.T. aircraft division, based in a factory that has produced everything from 90 m.p.h. wood and fabric biplanes to major components for today's transonic Javelin all-weather fighters.

The first is run like an English public school: the other is a typical, noisy, bustling engineering works. Yet the two are associated as happily as are the students in the classrooms and hangars, where men from India and Pakistan, Israel and Egypt and many other countries live and work together in a manner that shames the politicians.

Their predecessors have been doing so for a quarter of a century, because it was on June 25, 1931, that the A.S.T. School was opened officially by H.R.H. the Duke of Gloucester, who gave it the title of "Britain's Air University." The story of its first 21 years was told in *Flight* on June 20, 1952, and the main idea of this further account is to bring the record up to date.

It is nevertheless impossible to avoid all reminiscing, as the twin keys to the school's success are surely the 1931 decision to base flying instruction methods on those of the C.F.S., and the choice of site, for Hamble offers the kind of gentle, quiet beauty that older universities have found so necessary for serious study. It was this setting that led to the opening of the original airfield and factory in 1917, when Mr. A.V. (now Sir Alliott Verdon) Roe hoped to build also a garden city of 350 homes for the men who worked there.

"A.V.'s" philanthropic scheme was vetoed by the Government of the day, who refused permission for more than 24 of the houses to be built in wartime. But the foundations had been laid and the first aeroplanes began to take shape at Hamble, designed by a team of draughtsmen which included a young man named Roy Chadwick and flown by the equally famous Freddie Raynham.

Unfortunately, all the skill of these men, the inventive genius of "A.V." and the financial support of Crossley Motors were not enough to survive the trade slump of the twenties, and in 1928 the Avro company was sold to Mr. J. D. Siddeley (Lord Kenilworth), who already controlled the Armstrong Siddeley and Armstrong Whitworth companies. This was significant, for the latter company ran one of the four civilian training schools for pilots of the Royal Air Force Reserve, at Whitley, near Coventry.

By 1930, this school was beginning to prove inadequate, because it could be used only by light aircraft and the Air Ministry wanted its reserves trained to a higher standard, on more powerful types. This alone might not have justified expenditure of a great deal of money on aircraft and installations; but there was the prospect of other, very lucrative business.

The standard of flying instruction achieved by the R.A.F. was so highly regarded that pupils came to it for training from all over the world. Although flattering, this was also costly and the Air Ministry was only waiting for an opportunity to off-load its foreign pupils on to some competent civilian school. With typical commercial good sense, Mr. Siddeley realized that he already had a suitable airfield for such a school adjacent to his newly-acquired Avro factory at Hamble. There would be no difficulty in equipping it with advanced aircraft, as Armstrong Whitworth and Avro were supplying Siskins, Atlases and Tutors to the R.A.F. and these were just what was needed to supplement the lighter types.

There remained the problem of building up a staff of instructors of such calibre that the school would be able to offer a standard of training far in advance of anything then available commercially anywhere in the world. The obvious solution was to employ ex-R.A.F. personnel and to follow R.A.F. training methods so far as possible, and when the school opened unofficially on April 14, 1931, it was in the capable hands of G/C. R. J. F. Barton, who had commanded No. 1 F.T.S. at Netheravon. Many of the staff came with him from Netheravon and this close association with Service training has continued to the present day, when all A.S.T. flying instructors are ex-C.F.S. Category "A" men.

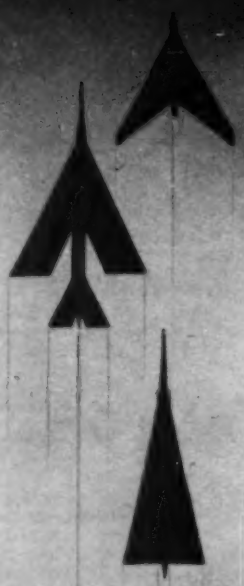
There have, of course, been big changes in training methods and equipment, to keep pace with new developments, and the types of aircraft used by the school have undergone continuous replacement. In the beginning there were fourteen aircraft—all biplanes—made up of two Avians, two Siskins, four D.H.9Js, four Atlases and two Tutors. Even at the time of the school's 21st birthday there were still many Tiger Moth biplanes on the strength.

Today the training fleet is all-monoplane, made up of five Chipmunks, six Oxfords, two Auster 5s and two Aiglet Trainers, plus the two Hiller 12B helicopters which show that A.S.T. is alive to the need for being in at the start of the V.T.O. age. They are, in fact, almost 12Cs, having most of the mechanical and structural improvements of the latter version, including modified engine, transmission, head and tail rotor drive.

All the training aircraft are now fitted with six-channel radio. This means that a student becomes used to the idea of traffic procedure and R/T patter from his very first flight; and by the time he reaches P.P.L. stage he is already commercial-pilot-minded. This is quite an important step forward, because even at Hamble the traffic pattern is more complicated now that both fixed- and rotating-wing aircraft are hopping around all day every day. Here again, A.S.T. has taken a leaf out of the R.A.F.'s book by adopting the "divided airfield" procedure used at South Cerney. In this, the fixed-wing aircraft follow left-hand circuits and the helicopters right-hand circuits, or *vice versa*, depending on wind direction. The circuit areas are thus separated, which is essential for safety reasons in anything like poor visibility because of the wide difference in approach speeds.

The man in charge at Hamble today is Air Marshal Sir Hugh Walmsley, K.C.B., K.C.I.E., C.B.E., M.C., D.F.C., who succeeded G/C. Barton as managing director in August 1952. His 36 years' service in the R.F.C. and R.A.F. included a period as Deputy Chief of the Air Staff in 1948-50, followed by appointment as A.O.C.-in-C. Flying Training Command: so he brought to A.S.T. a very valuable and up-to-date knowledge of Service methods. The same is true of the director of training, G/C.

pioneer designers of the ejection seat



**UNPARALLELED ACHIEVEMENTS**

**Squadron Leader J. F. Fifield, D.F.C., A.F.C., made aviation history when he successfully ejected from a Meteor aircraft at runway level during September and again the following month at an altitude of more than 40,000 feet.**

**Martin-Baker Fully Automatic Ejection Seats were used for both tests, proving yet again that these seats are undoubtedly the finest in the world of aviation.**

**NOTE TO AIRCREW:**

**The Seat used for the runway ejection was fitted with modified time release, not yet incorporated in Service equipment.**

MARTIN-BAKER

# In Service with the Royal Air Force

*The ability to complete pilot training to "Wings" standard on the minimum number of aircraft types is an ideal at which all Air Forces aim. The JET PROVOST has demonstrated that with a maximum level speed of more than 280 knots, a ceiling of 35,000 ft., a retractable nosewheel undercarriage, air brakes and a turbo jet engine, it is ideally suited to ab initio training in addition to leading into the advanced trainer . . . so enabling the two-stage training ideal to be maintained for many years to come. Furthermore, the need for jet conversion training on the expensive Advanced Jet Trainer no longer arises.*

## JET Provost

*Powered by one Armstrong Siddeley Viper Turbo-Jet*

**HUNTING PERCIVAL AIRCRAFT LTD**

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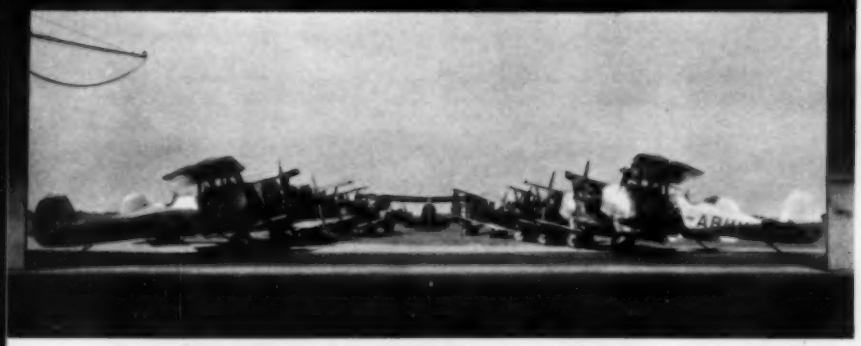


*Line-up of the 1931 Hamble fleet—14 strong —with four Armstrong Whitworth Atlases in the foreground and including Avians, Siskins, Jaguar-engined D.H.9Js and Tutors.*

*Some of today's 17-strong fleet, headed by one of the Hiller 12B helicopters.*

## A.S.T.'s QUARTER CENTURY . . .

E. A. Warfield, C.B.E., D.F.C., whose last appointments before joining A.S.T. in January 1953, were on the directing staff of the R.A.F. Staff College and as O.C. of a Meteor Advanced Flying School.

W/C. A. H. Abbott is still chief instructor, responsible for the efficient operation of all A.S.T. training; but the chief flying instructor since April 1954 has been S/L. George Webb, A.F.C., who began as a Halton apprentice in 1925 and, like A.S.T. itself, celebrates 25 years of flying this summer. In that time he has logged well over 11,000 hours in the air, which adds up to a formidable total of take-offs and landings, because most of his time has been spent on instructional flights of short duration.

He joined the company in 1936 and became C.F.I. at the Watchfield Beam Approach School which A.S.T. operated for the R.A.F. during the war. Rather surprisingly, he can also claim to be a pupil of his own school because, when the two Hillers were bought in 1955, he added a helicopter rating to his Airline Transport Pilot's Licence after instruction at Hamble by Col. Fourcaud of Helicop-air and Lt-Cdr. Simpson of the Royal Navy, whose other "customers" have included H.R.H. the Duke of Edinburgh.

S/L. Webb now devotes some 25 per cent of his time to helicopter flying, assisted by F/Ls. R. A. V. Hazlehurst and L. A. Fieldhouse, both of whom gained their helicopter ratings on Hillers at Hamble. They too divide their time, spending half of each day instructing two helicopter students and the other half with four pupils on fixed wing aircraft.

As in the past, most of the latter are civilians, with a high proportion coming from overseas; but the helicopter pupils are almost exclusively R.A.F. and British Army personnel, because A.S.T. have a contract for *ab initio* training of a large number of R.A.F. rotating-wing pilots. Exceptions are the three civilians who were the first pupils trained on the Hillers, and some Belgian Air Force pilots who are taking the special R.A.F. course, which lasts three weeks and involves 20 hours' flying.

The number of civilians who can afford 18 hours of instruction at £35 an hour is, unfortunately, limited; but about 70 Service pilots, all with previous fixed-wing experience, have taken the R.A.F. course in batches of three or four. Most of them have gone solo after 4-4½ hours and only two have been failed. Some of the credit for this fine record must be given to the Hillers, which are achieving a utilization of some 600 hours each per year without any trouble since their modification to 12C standard.

*One of the earliest flight simulators, built at A.S.T. in 1935 by F/L. H. F. Jenkins and F/O. R. C. Berlyn.*

Although this comparatively new side of the business is thriving, with the two Hillers operating almost to capacity, instruction on fixed-wing aircraft still forms the major work of the Flying Wing, and there are just on 40 fixed-wing trainees at the present time. The main task is to train pupils to the standard where they can qualify for the professional Pilot Licences, and the men generally complete some kind of *ab initio* training before arrival at Hamble. About two-thirds of them come from overseas and are generally sent either by their governments or airlines, because few can afford the £2,000 and full year of study that are the cost to a private individual.

One of the newest customers is Lufthansa, for whom A.S.T. trained a nucleus of 25 pilots and instructors. Some of these men had flown on the German pre-war Atlantic seaplane service but had to start again almost from scratch after being out of touch with changing techniques for so long. Garuda Indonesian Airways will also have a nucleus of A.S.T.-trained pilots, and El Al sends many of its personnel to Hamble for training. Present pupils include seven from the Gold Coast and Nigeria, who will fly Wayfarers of West African Airways Corporation when they have their Senior Commercial Pilot's Licence, and two from Jamaica who hope to graduate on to British West Indian Airways' Viscounts in due course.

Two special distinctions of which the school is proud are that it is one of the few in the U.K. whose course for the Commercial Pilot's Licence is "approved" by the M.T.C.A., and that it is the first school in any country to which I.C.A.O. has sent students to whom it has granted fellowships for flying training.

However, not all pupils are potential airline pilots and there are special courses up to the standards required for a Private Pilot's Licence and Flying Instructor's Certificate, as well as aerobatic courses and day and night twin engine conversion.

Nor are all the pupils men. Amy Johnson trained at Hamble in the thirties and other women (from as far distant as Hong Kong) have followed in her footsteps. Pupils "live in," with some of the lucky ones accommodated in Hamble House, the beautifully-situated pre-war home of Sir Alliott Verdon-Roe. They are expected to put in about two hours of study each evening; but have plenty of scope for recreation, with facilities for rugby and association football, cricket, hockey, tennis and squash racquets, as well as a fully-equipped gymnasium, indoor miniature rifle range, cinema, billiards and table tennis rooms.

It is easy to forget that training for a professional Pilot's

*Two of Hamble's international "clientele" discuss a flight with an instructor alongside one of five Chipmunks.*

"Flight" photograph

*Three A.S.T. instructors—S/L. George Webb, A.F.C., who is C.F.I. (centre), F/L. R. A. V. Hazlehurst (left) and F/L. L. A. Fieldhouse.*

## A.S.T.'s QUARTER CENTURY . . .

Licence involves far more than flying instruction, and that the Flying Wing is only one of four equally important schools at Hamble. To qualify for a Senior Commercial Pilot's Licence, for example, a pupil must pass examinations in nine subjects, including aviation law and flight rules, flight planning, aeronautical charts, navigation, radio aids, instruments, meteorology, signals and aircraft technical knowledge. All these are covered fully by A.S.T. courses in lecture rooms and workshops located in blocks of buildings situated between the airfield and road at Hamble.

One of the three specialist sections is the School of Navigation, under S/L. C. N. Hoy, which offers advanced technical training for the Flight Navigator's Licence in addition to the instruction it gives to pilots up to the standard required for the Airline Transport Pilot's Licence.

Then there is the School of Aircraft Radio, headed by Mr. F. E. Barltrop, with courses for Aircraft Radio Officers' Licences and for radio officer/wireless mechanics. Allied to it is the School of Marine Radio and Radar for merchant marine radio officers.

Finally, the world-famous School of Aircraft Engineering, of which Mr. S. Ward is chief instructor, provides training for all Aircraft Engineers' Licences and has an average of 80-100 pupils at all times. There is a special course for technical officers of Dominion and foreign air forces, and a diploma course which covers material testing, physical laboratory work, aerodynamics, and the application of electronics. To supplement their training at Hamble, the men can be sent on engine courses with B.E.A., Rolls-Royce, Armstrong Siddeley and other organizations, or to Field Aircraft Services at Bovingdon for practical experience when studying for their X (instruments) Licence.

Inevitably, a short conducted tour of these Schools gives anything but a well-balanced picture. The all-important basic equipment and techniques are taken for granted and one remembers only a few details such as the sectioned Jumo turbo-jet which forms a surprise exhibit in a lecture room of the Engineering School, side-by-side with a sectioned Derwent and Theseus, a row of piston-engines and a highly-polished exhibition Mamba.

The School of Navigation has two new Air Trainers Link D4s. These have been set to simulate a Dove, which is important, because the Links on which pupils take their M.T.C.A. tests also simulate a Dove and the flying tests from Stansted are made on this type of aircraft. In the D4s, pupils can learn to use every type of radio aid except VOR, and the standard course covers such up-to-date techniques as trans-polar navigation and pressure-pattern flying.

A surprise here is a picture of what must surely be one of the first-ever flight simulators, built at A.S.T. in 1935 by F/L. H. F. Jenkins and F/O. R. C. Berlyn. Built of Tutor components and worked by lead weights and suction, it gave a fairly accurate representation of flying in a Tutor.

Biggest surprise of all, though, is in one of the engineering hangars, where one is confronted by a strange wingless airframe that seems ready to have a tug-of-war with itself. It is in fact, no re-incarnation of the wartime Dornier Do 335 "push-and-pull" concept, but merely the forward fuselages of two retired Tiger Moths, each complete with centre section and undercarriage, joined together to form a convenient mobile test-bed for equally-retired Gipsy engines assembled by pupils under training.

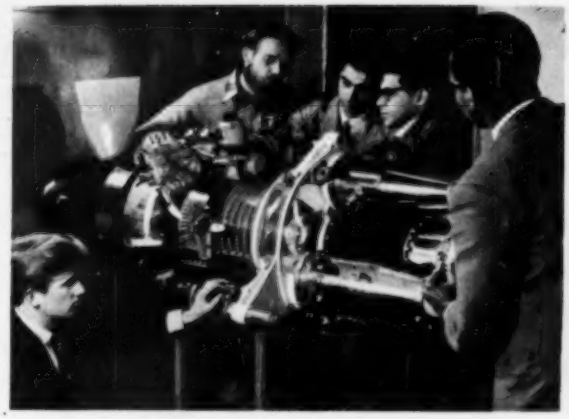
All this ignores the mass of first-class equipment and material provided for the pupils' use, which ranges from a well-equipped drawing office to electrical test rigs, an industrial microscope, radar sets and a small wind-tunnel. Suffice to say that nothing is missing that would help a pupil to reach the highest standard of efficiency, for the whole principle of A.S.T. training is to teach men to become the finest possible airmen and engineers, not merely to ensure that they gain a paper licence by cramming the essential minimum of study and experience into the shortest possible time.

After the public school atmosphere of the A.S.T. Training Division, it is a little startling to have to sign registers and carry passes when one merely crosses the road to the Aircraft Division. But the security checks are necessary, for this branch of the business is extremely busy on important and, to a large extent, secret work.

Although its history can be traced back to 1917, it cannot share fully the A.S.T. "silver jubilee," as it remained under Armstrong

*Another of A.S.T.'s activities — the School of Aircraft Radio.*

*Students from all over the world come to Hamble: here some of them examine a sectioned Mamba in the School of Aircraft Engineering.*



Whitworth control until 1940, when A.S.T. activities underwent a complete change. In a sense, the change had been foreshadowed as early as 1934 when the company became a member of the newly-formed Hawker Siddeley Group and began to widen its scope.

In the following year, it extended its syllabus to include blind flying instruction, of which, with the C.F.S., it had been a pioneer, and began the job of converting Imperial Airways pilots to fly the Empire flying boats, using Calcuttas to supplement its smaller Cutty Sark amphibians. But the most significant move was the opening on January 6, 1936, of a new training school at Ansty, near Coventry, as A.S.T.'s contribution to the R.A.F. expansion scheme. Less than two years later, in December 1937, Hamble became No. 3 Elementary and Reserve Flying Training School and Ansty No. 9 E and R.F.T.S., under war organization. Within two more years, war had become reality and by August 1940 all flying training had ended at Hamble.

During the later war years, A.S.T. operated No. 9 B.F.T.S. at Ansty, No. 1 Beam Approach School at Watchfield, No. 3 E.F.T.S. at Shellingford and the R.A.F. School of Air Traffic Control at Watchfield. But over 2,000 of its employees in 1941 were busy on Spitfire repair in the ex-Armstrong Whitworth factory at Hamble and a satellite works at Exeter.

Together, they returned to service nearly 3,400 Spitfires as part of the Civilian Organization under Supermarine's and, when the Allied armies invaded Europe in 1944, set up a Spitfire Repair Depot in France which remained in operation until the end of the war. In addition, A.S.T. converted Spitfires into Seafires, modified a Fortress for anti-submarine work, converted Yorks for service with B.O.A.C. and modified large numbers of U.S. aircraft to make them suitable for service with the R.A.F. and the Fleet Air Arm.

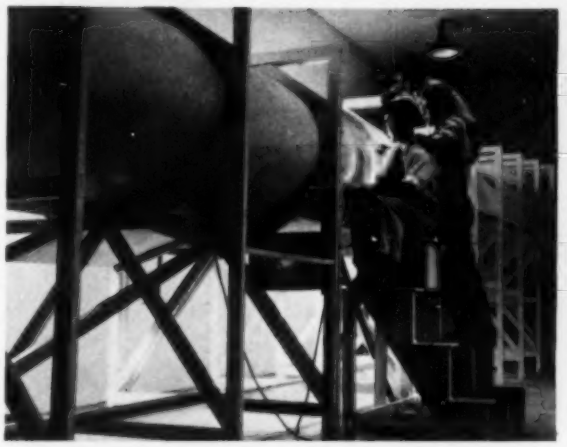
After the war, the Training School returned to the north side of the road, but A.S.T. retained control of the factory on the south side and the two became the Training Division and Aircraft Division respectively. Under the Hawker Siddeley Group system of sharing production contracts, the factory was soon filled with the manufacture and assembly of Meteor components for Glosters. At the same time, A.S.T. took on the job of designing all flying test-bed installations for the Group and making the necessary airframe modifications. Aircraft converted in this way included a Mamba-Lancaster, Sapphire-Lancastrian, Sapphire-Meteor, Derwent-Lincoln, a Dovern-Lancaster for Sweden and an Atar-Meteor for S.N.E.C.M.A. of France.

Today, instead of Meteor components, large pieces of Javelin are being built in very satisfactory quantities by about 1,850 Aircraft Division employees at Hamble. The old wooden-floored Avro factory of 1917 is still recognizable; but large extensions have been added and these are filled with jigs for Javelin inner wings, tail units, rear fuselages and other components that make up some 30 per cent of the complete airframe. In addition, A.S.T. are making all the Javelin under-fuselage drop fuel tanks, as a follow-on to production of more than five thousand Meteor tanks.

Nor is that all, for a very able design office of about 100 draughtsmen, stressmen and loftsmen has been built up by the Director of the Aircraft Division, Mr. H. W. Sidwell, O.B.E., A.F.R.Ae.S., who has been with the Group for over 30 years and with A.S.T. since the Armstrong Whitworth factory was taken over in 1940. This D.O. was entrusted with the task of producing all the design drawings necessary for building a tandem-seat trainer conversion of the Javelin, and the first trainer is now taking shape in the experimental shop at Hamble.

Another interesting conversion that will soon emerge from this shop is a Hunter that has been modified to carry and fire Fairey Fireflash air-to-air guided weapons. The intention of flight testing the Hunter-Fireflash combination, as a potential weapon for NATO air forces, was announced some time ago. It was stated that the conversion would be relatively simple, and this claim does not appear to be optimistic as the necessary radar scanner has gone quite easily into the Hunter's nose without spoiling its aerodynamic shape.

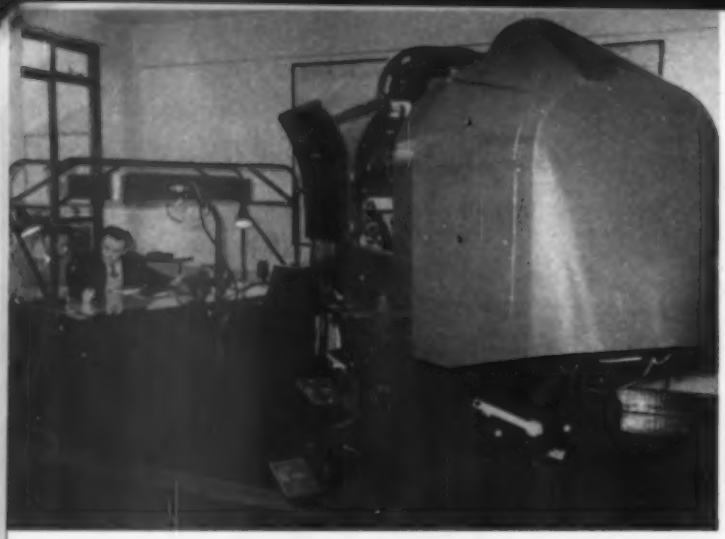
Looking to the future, the Aircraft Division has its own private training schemes to ensure a steady flow of the skilled men that are needed even more urgently now that aeroplanes are becoming increasingly complex. Already a new Apprentice School, containing the most up-to-date equipment, has been opened by Sir Arnold Hall, technical director of the Hawker Siddeley Group.



*Three overseas students study the 3ft by 2ft wind tunnel.*

Nor are the activities of Air Service Training restricted any longer to the U.K. The company helped the Indian Government to open an Indian Air Force Technical College at Bangalore in 1949, with a staff of about 60 A.S.T. employees, headed by G/C. J. Beaumont, O.B.E., A.F.C. It has proved highly successful and is being handed over to the I.A.F. next month. A similar school opened at Korangi Creek, Karachi, for appren-

*Flying and study over for the day, students relax in their comfortable lounge, catching up on the world's news.*



*An overseas pupil checks his plot with the instructor after "flying" one of A.S.T.'s two Air Trainer Link D4s.*

## A.S.T.'s QUARTER CENTURY . . .

tices of the Pakistan Air Force has already been handed over to the Pakistan Government. However, A.S.T. continue to run the two public schools which they opened in Pakistan in 1952 to give a general education to selected Pakistani boys so that they will have the necessary educational standards should they wish to join the air force on leaving school.

Like all enterprising people, the directors of A.S.T. are not content merely to sit back smugly and reflect on yesterday's achievements or today's good business. They, more than most of us, know how serious the shortage of trained pilots for civil aviation will become in a few years' time and have proposed that a proper scheme of training should be started right now, with the financial support of the M.T.C.A. or the Corporations. Is it logical, they ask, that the R.A.F. will be willing to lose its best pilots regularly so that they can fly airliners, or even that such men would want to leave the Service? In any case, when they do leave, they are seven or eight years older than the airlines want their new aircrew to be, and often with experience of flying only jet aircraft.

The ideal would be to have a steady intake of selected young pupils for training to Commercial Pilot's Licence standard, with instrument rating: after which they could earn a living whilst studying for their senior "ticket" or Airline Transport Pilot's Licence. This makes sense, especially with the necessary training organization already in being at Hamble. By the time Air Service Training reach their 30th or 35th birthday, their plan for an airline pilots' training school may well have become fact, and this could be one of the best things that ever happened to British commercial flying. J. W. R. T.

# DOWTY SILVER JUBILEE

INTO the old-world graciousness of Arle Court, Cheltenham, last Friday, came many, if not most, of our leading designers and technicians. Having lingered on the sunny terraces they passed at length down an awninged walk to be welcomed by Mr. G. H. Dowty, founder and chairman of the Group bearing his name. (He has yet to receive the accolade of the knighthood conferred upon him in the recent Birthday Honours List.)

A luncheon marked the Group's Silver Jubilee and the Rt. Hon. Reginald Maudling, Minister of Supply, gave the toast. Mr. Maudling said that there must continue to be a number of large businesses to take advantage of large-scale production; but if there were to be only large businesses then complete stagnation would result. The Dowty Group he described as an industrial classic, for between 1931 and 1939 one man had built up a business having a ten-million-pound order book.

The threat of Russian competition to the aircraft industry, he said, must be taken with the utmost seriousness. Our own aircraft industry represented possibly our biggest industrial challenge. Certainly we were facing what the shipbuilders never had to face: the greater resources of the U.S.A.

Mr. Dowty recalled how 32 years ago he came to Cheltenham and took a job as a draughtsman with the Gloucestershire Aircraft Co. (The Dowty history was told in detail in *Flight* of May 30, 1952.) There had been difficult moments. "I remember," he said, "the first undercarriage I supplied to Hawkers, back in 1935, which had a fine slender leg made possible by a new form of suspension, and it was of remarkably low weight. Bill Pegg was flying the machine, a Fury, but alas during a flick roll, the landing gear parted company from the airframe. How I hung my head in shame; and yet, in spite of this most unpromising start, I am happy to say that I have never lost an order from Hawkers."

Having referred to Mr. Maudling as "a man who had left his imprint of resolution and initiative on the aircraft industry," Mr. Dowty recalled that he was formerly Economic Secretary to the Treasury. "I do not know," he said, "if during that period he had anything to do with the new Premium Bond lottery, but if he did, he will find something in common with our aircraft designers who are well versed in handling a little flutter!"

Mr. R. H. Bound (director, Dowty Group, Ltd.) proposed the Guests, referring in particular to Sir Sydney Camm, on whose design staff he had had the privilege of working before he came to Cheltenham. Sir Sydney, he said, had taught him more about good designing than he could ever thank him for.

Sir Sydney Camm, director and chief designer of Hawker Aircraft, Ltd., responded by recalling early perplexities in deciding upon electric or hydraulic retraction for the undercarriage. The U.S.A. were at that time solid for electrics; but Mr. Dowty had remarked to him that it was odd that something which needed to be moved at 1 r.p.m. should be operated by something turning at thousands of r.p.m. So hydraulics were adopted. With Dowtys, said Sir Sydney, the job had always come first—not costs or expediencies.

Mr. H. G. Herrington, managing director of High Duty Alloys, Ltd., also responded, though in less technical vein.

*Sir Sydney Camm speaking at the Dowty luncheon.*

## R.Ae.S. COUNCIL

THE Royal Aeronautical Society has recently announced the constitution of its Council for the year 1956-57. Names of officers and members are as follows:—

**President:** E. T. Jones, C.B., O.B.E., M.Eng., F.R.Ae.S.

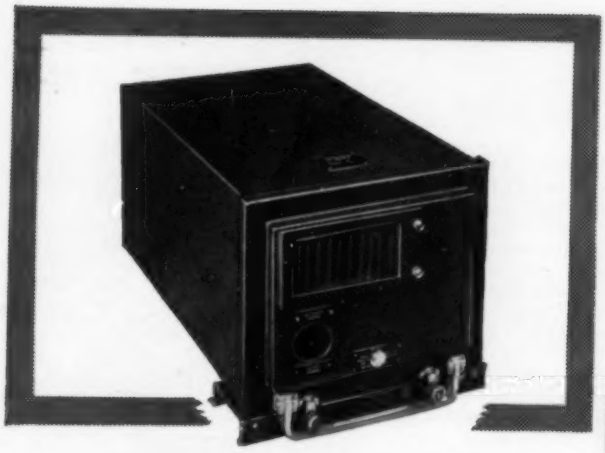
**Past Presidents:** N. E. Rowe, C.B.E., B.Sc., F.C.G.I., F.I.A.S., F.R.Ae.S.; Sir Sydney Camm, C.B.E., F.R.Ae.S.; Sir William S. Farren, C.B., M.B.E., M.A., D.Sc., F.R.S., M.I.Mech.E., Hon. F.I.A.S., F.R.Ae.S.

**President Elect:** G. R. Edwards, C.B.E., B.Sc., F.R.Ae.S.

**Vice-presidents:** Sir Arnold A. Hall, M.A., F.R.S., F.R.Ae.S.; P. G. Masefield, M.A., Hon.F.I.A.S., F.R.Ae.S.; E. S. Moult, Ph.D., B.Sc., M.I.Mech.E., F.R.Ae.S.

**Ordinary Members:** A. Cdre. F. R. Banks, C.B., O.B.E., M.I.Mech.E., F.R.Ae.S.; Prof. A. D. Baxter, M.Eng., M.I.Mech.E., F.R.Ae.S.; Maj. G. P. Bulman, C.B.E., B.Sc., F.R.Ae.S.; Prof. A. R. Collar, M.A., D.Sc., A.F.I.A.S., F.R.Ae.S.; Handel Davies, M.Sc., A.F.I.A.S., F.R.Ae.S.; Prof. W. J. Duncan, C.B.E., D.Sc.(Eng.), F.R.S., M.I.Mech.E., F.R.Ae.S.; L. G. Frise, B.Sc., A.F.I.A.S., F.R.Ae.S.; H. H. Gardner, B.Sc., F.R.Ae.S.; Sir Harry M. Garner, K.B.E., C.B., M.A., F.R.Ae.S.; P. A. Hearne, D.C.Ae., D.L.C., Grad.R.Ae.S.; Air Marshal Sir Owen Jones, K.B.E., C.B., A.F.C., B.A., D.I.C., M.I.Mech.E., F.R.Ae.S.; B. P. Laight, M.Sc., A.M.I.Mech.E., F.R.Ae.S.; E. J. Mann, F.R.S.A., A.I.Mech.E., A.R.Ae.S.; M. B. Morgan, M.A., F.R.Ae.S.; F. M. Owner, C.B.E., M.Sc.(Tech.), M.I.Mech.E., F.R.Ae.S.; B. S. Shenstone, M.A.Sc., A.F.C.A.I., A.F.I.A.S., F.R.Ae.S.; P. B. Walker, C.B.E., M.A., Ph.D., F.R.Ae.S.

**Officers:** Hon. Treas.: Maj. G. P. Bulman, C.B.E., B.Sc., F.R.Ae.S.; Solicitor: L. A. Wingfield, M.C., D.F.C., A.R.Ae.S.; Secretary: A. M. Ballantyne, T.D., B.Sc.(Eng.), Ph.D., A.F.I.A.S., F.R.Ae.S.



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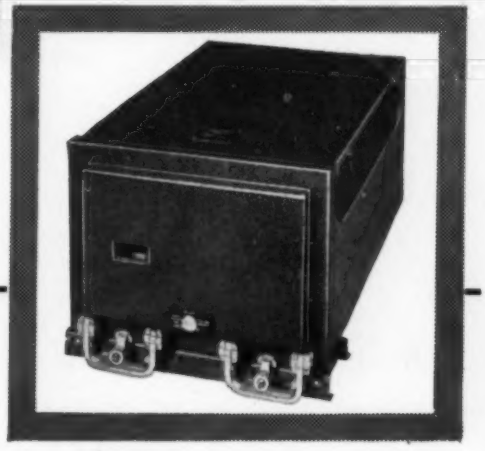

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- **Up to 200 crystal controlled channels.**
- **Valves replaceable by standard American types.**
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Illustrations: *(Top)* Power Amplifier Unit. *(Centre)* Drive and Receiver Unit. *(Left)* Modulator and Power Unit. Not shown is the automatic Aerial Tuning Unit.

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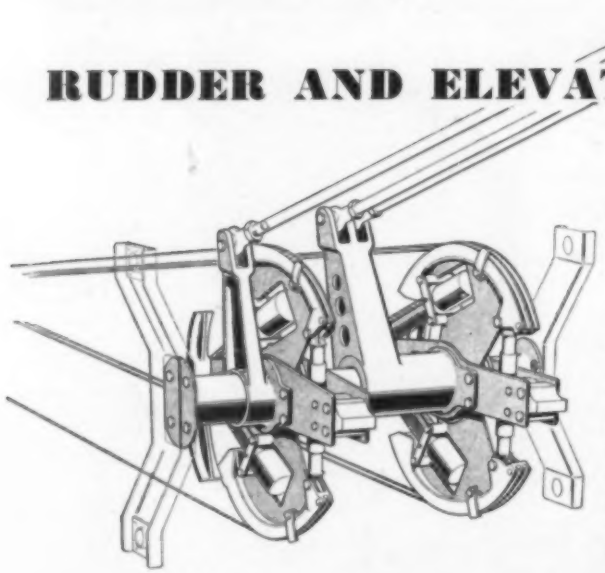
# RUDDER AND ELEVATOR CONTROLS



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# CORRESPONDENCE

*The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns; the names and addresses of the writers, not for publication in detail, must in all cases accompany letters.*

## I.C.A.O. and M.T.C.A.

I READ with interest and sympathy the article "Spring Cleaning the Annex," by "Visor" [*Flight*, May 18].

All his arguments are sound and valid, but I fear he will in time become tired and depressed battering his head against the M.T.C.A. The Ministry follows slavishly, and even improves upon, the standards and recommended practices of I.C.A.O., standards designed to cover pilots of the whole world, good, bad, and indifferent.

There must be moderation and adaptation in all matters. As our manufacturers are finding, it is no use to have very high standards and price oneself out of the markets. The burden of Government regulation may yet prove a greater drain on the taxpayer than he will feel able to pay.

Woking, Surrey. D. F. SATCHWELL.

## Unhonoured

HER MAJESTY'S Birthday Honours list makes, as usual, dismal reading so far as the flying fraternity is concerned. We have the usual crop of managing directors, civil servants, engineers and technicians but all too few pilots, who after all actually fly and on whom the ultimate responsibility rests.

Her Majesty has seen fit, on someone's recommendation, to knight actors and jockeys and cricketers, but pioneer airline captain O. P. Jones, whose flying career is unique, has been allowed to slip away into retirement with a miserable scroll from B.O.A.C. to contemplate in his leisure moments.

It would therefore appear to be no one's job to watch the interest of aircrew. Surely the Minister concerned with civil aviation should be interested?

Fair Oaks, Surrey. C. ARTHUR.

[Though we agree fully with our correspondent's sentiments in general, his remarks concerning Capt. O. P. Jones might be taken to mean that this distinguished pilot had never appeared in the Honours List, whereas C.V.O., O.B.E., does appear after his name.—Ed.]

## Britain's Airline Equipment

I HOPE you will allow me to comment on the latest letter by your correspondent who styles himself Icarus (*Flight*, June 1), because some comment is certainly needed.

In the first place, a good many of B.O.A.C.'s troubles have nothing whatever to do with the aircraft they operate, but are purely the result of meddling by politicians. As far as the actual aircraft are concerned, the answer is a simple one: British manufacturers *can* produce the aircraft which the Corporation needs for most of its routes, perhaps for all of them. For that reason alone B.O.A.C. *must* fly British, because in no other way can the aircraft industry in this country prove to the rest of the world that it has the right type of aircraft for sale. Does "Icarus" really believe that either the Viscount or the Britannia would ever have progressed beyond the prototype state but for the orders initially placed by the corporations? And surely the value of the British aircraft industry as an earner of foreign currency is far in excess of that of B.O.A.C.

A further point worth making is that B.E.A. have had a predominantly British fleet for some time now, yet, despite very difficult operating conditions, they go from strength to strength. I do not think that anyone in his right mind would wish to see the Corporations operating British aircraft unless they are at least as efficient as the best foreign counterpart, which brings me back to my original contention that they are so today. As far as the Comet is concerned, surely this is a sorry tale of over-confidence, political meddling, cockiness and far too much ballyhoo. I hope that de Havillands confound us all and produce a world-beater; but if the performance figures for the Tu-104 and the Convair jet airliner are to be believed I cannot see any point in producing an aircraft which is hopelessly outclassed. If later versions of the Britannia cruise at 480-500 m.p.h., as is predicted, then what can the Comet 4 do that the Britannia cannot do better and more cheaply?

I cannot understand why "Icarus" should quote 1946 as a year in which to judge the performance of British aircraft. Can anyone think of a bigger collection of junk than converted Lancs, converted Sunderlands and Yorks? A more damning comparison, if one is required, would surely be the period when B.O.A.C. were flying Hermes and Solents; these were fairly serious attempts to produce competitive aircraft. But surely the answer is this, that the British aircraft industry never did, until the Viscount, cater for world airlines, and under the circumstances it had to break a few eggs in making its first successful omelette. The Viscount has proved itself; the Britannia almost certainly will do likewise, together with its derivatives, and then we have the Vanguard, the Herald and the Twin Pioneer—and, who knows, perhaps even the Comet 4.

I hope the day will come when British aircraft manufacturers will, like British shipbuilders, be able to stand entirely on their own feet and supply world markets without any political help. Of one thing I am certain, and that is that "Icarus" cannot substantiate his view that, with the aircraft now available, B.O.A.C. cannot fly British and make a profit. If they cannot make a profit with the Britannia they will never make a profit with anything. And since we have no long-range jet aircraft available, let us buy Boeing or Douglas aircraft, but fit them with Conways: the odds are that if this were done it might very well stimulate a lively export trade in these engines. In any event there seems ample room in the sky for both turbojet and propjet aircraft and there is no reason why Vanguard or Britannia sales should suffer as the result of an order for 707s or DC-8s. Let us buy the best aircraft for the job, only give British manufacturers the opportunity to prove that they can produce the best.

Twickenham, Middlesex. A. S. RICHARDSON.

## Skymaster History

WITH reference to correspondence in *Flight* of April 6 and May 11, regarding Skymasters Nos. NL 300 and 316, confirmation of the remarks made by Mr. Van der Klaauw comes from our charter superintendent, Douglas Marshall.

In March and April, 1946, his log-book shows he returned from Batavia on a K.L.M. Skymaster NL 307 and 314 to Amsterdam, having ferried a DC-3 to Java for British Aviation Services, Ltd.

Marshall recalls that it was, to his knowledge, the only scheduled service on which he could rely to return to the U.K., after ferry flights to the Far East, although the service had been operating for only some five months with K.L.M. crews.

London, W.1. F. E. PEARCE
(Regional Press Officer, K.L.M.).

## The First Ailerons

A MOST interesting correspondence on ailerons has lately appeared in *Flight*. I happen to be in a position to throw some light on the subject. May I do so?

I have known many of the first pioneers of aviation—Archdeacon, founder of the Prix Deutsch-Archdeacon, Farman, Tabuteau, Chanteloup, Chevillard, Weiller and Hart O. Berg, and the whole Blériot family. It is quite possible that the principle of the aileron may have been found long before 1900. By its name, the aileron seems to have been born in France. I agree with you that Santos Dumont apparently had "ailerons" on one of his machines. They did not work, and this is proved by the fact that he later gave them up. Moreover, I don't think, knowing the ground at Bagatelle very well, that he ever intended to use them as ailerons, in the active sense of the word. As a matter of fact, Santos in 1906, when he flew 220 metres at Bagatelle, did not intend to turn, neither was he capable of doing so.

Then came the great Henry Farman, bicycle and motor racer, and, though it seems forgotten now, of English descent. I had a long conversation with Farman, before I wrote my book *Conquering the Sky*, and his words made very clear a wonderful story:—

"If I flew so very low in 1908," admitted Farman modestly, "it was to avoid killing myself before having obtained decisive results. Every morning, we had to lift the aeroplane over a 3ft wall, to get into Issy les Moulineaux 'airfield,' the French Army Engineers having absolutely refused to let that wall be demolished, as it belonged officially to 'national defence.' I flew—that is to say, I left the ground. At the beginning, mechanics and friends threw themselves on their hands and knees, not to be clear of the propeller, but to satisfy themselves that I was actually leaving the ground! And they shouted with glee: 'Il a volé!'

"I was *voling* indeed, but very low always, not because I would not risk my life, or I wouldn't have gone in for such a silly pastime—but on account of my little black book. I kept this little book very carefully, making an entry after each flight, and putting down all I was learning. If I was careless or rash, I would kill myself, and that would be the end of the little black book, the end of my beautiful experiment. My great problem was turning. The Deutsch-Archdeacon prize, which I was to win on December 13, 1908, meant several turns, as it was given for the *first kilometre flown in this world on a closed circuit*, coming back to the starting point. (The prize was 25,000 gold francs.) But I still was not satisfied with wing warping, used by the Wrights, and by my friend and rival Blériot as late as 1910. I found it heavy, clumsy, and unreliable, slow acting in a gust or a tense situation. One night,

## CORRESPONDENCE . . .

an idea came to me. After landing, I turned to my mechanic and said: 'It would be far lighter and safer if we cut out parts of the wings, and had them fold down, like doors, into the airstream. I would get more lift, and would, with a lighter touch, be able to pick up a descending wing, or bank into a turn.' 'All right,' said he, 'How much do you want cut out?'

"Purely by instinct, born from feel and use of the machine in the air, I told him: 'About that much . . .', and I marked with chalk the area which was to become mobile. I must say people around me scoffed at the idea, and shouted I would kill myself instantly. Be we kept on. I tried the device. It worked. I turned easily and won the Cup."

This is the story of Henry Farman, most modest of men and one of the bravest, told me a few years ago, with a faint smile as his wonderful memories came back to him.

I thought it my duty to repeat his words, if only as a testimony and proof of deep and lasting admiration for those extraordinary pathfinders, from the Wrights to Blériot, Farman, and others (some of them still alive) who have enabled us to see the oldest of mankind's dreams come true before our eyes.

For after all, it is to this long line of people who risked their lives, from C. S. Rolls down to John Derry, that I owe the fact that I may now go to Rome in less than three hours.

Dordogne, France. HERVE LAUWICK.

### The D.H.9A

I WAS greatly interested in Mr. J. M. Bruce's article on the D.H.9A, called by all airmen the "Ninak." I joined No. 70 Sqn. in February, 1928, and our immediate neighbours in Iraq were No. 55 Sqn., and at the east end of the aerodrome No. 30 Sqn. were billeted. Both these squadrons did an enormous amount of work during the various uprisings, and no doubt their past members will have memories of some of the outlandish places where they operated from during those uprisings. It was 70 Squadron's job to supply these flights with food, petrol, ammunition, and not forgetting beer—the one thing that kept us going. Sheikh Mahmoud was finally forced to surrender and brought to Hinaidi in a Victoria sent by No. 70 Sqn.

Darlington, Co. Durham. J. T. BENNETT.

### Still-secret German Reports

AS one of a group of enthusiasts actively interested in collecting material on wartime German aviation development may I be allowed to congratulate Mr. A. R. Weyl on his most interesting account of the W.G.L. symposium held at Munich?

I was gratified to see that he made mention of the policy, prevailing after the war, of withholding from the general public the majority of official reports condensed from captured enemy documents, presumably on the grounds of security. At that time, this seemed an eminently sensible thing to do, as use was to be made of this captured data in developing weapons of our own. A good example of this is the Aden gun, which is basically, a much improved Mauser MG 213C/30 cannon of 1944-45 design-vintage.

Owing, however, to the German system of report distribution, this suppression of captured information may not have been such a bright idea as it then appeared. For example, an original Z.W.B. wind-tunnel report which British troops removed from the Focke-Wulf library in Bremen probably had a sister copy sitting in a pigeon-hole at Augsburg, which the Americans appropriated when they overran Messerschmitts; and a third example of this report was no doubt picked up by the Russians when they examined the D.V.L. archives at Berlin/Adlershof. So in all probability, both the Russians and ourselves started off pretty parallel in the use of basic German data, although of course, this argument is purely hypothetical.

Now we come to 1956—only to discover that this "restricted" attitude towards wartime German research still prevails. Of the many thousands of reports, on all manner of aeronautical achievement in the fields of jet and rocket propulsion, guided weapons, and countless other sundry developments, not to mention literally tons of Luftwaffe staff and operational records, plus a good few roomfuls of P.O.W. interrogation reports—out of all this mass of priceless documentation, there has come from Her Majesty's Stationery Office perhaps two hundred reports in the C.I.O.S., F.I.A.T. and B.I.O.S. range. Of this pitifully small number, some are so badly presented as to be virtually unreadable, whilst innumerable mistakes, which can only be attributed to carelessness, mar a goodly proportion of the remainder.

As the Soviet Union is repatriating many of the technicians who worked on a number of these developments, would it not be an opportune moment for the Government also to throw a little light on this subject, by allowing interested persons to examine those official reports which have now been classified for over eleven years? I cannot see how security can be raised as an objection, when the Russians are themselves releasing the authors of many of the original documents from which our own official reports were prepared.

London, W.4. RICHARD P. BATESON,
German Aviation Research Group Of Air-Britain.

*This highly characteristic photograph of a D.H.9A accompanied the letter (col. 1) from Mr. J. T. Bennett. It shows a machine of No. 30(B) Sqn. over Hinaidi, Iraq, in 1928.*

## NEW ZEALAND AVIATION PROGRESS

THE idea that New Zealand aviation is a pampered baby fattening on hidden subsidies was combated by the Director of Civil Aviation, Mr. E. A. Gibson, in a recent speech to the New Zealand Roads Federation. Dealing with the expansion of aviation in the post-war decade, he estimated the increased wealth due to agricultural aviation as follows: Increase in capital of rural land, £20,000,000; increase in sheep population £4,000,000; increase in cattle population £1,000,000; increase in annual farm income, £6,000,000.

Mr. Gibson said that last year the New Zealand Government spent some £2,500,000 in civil aviation. Of this sum £196,000 represented the normal cost of running the portion of a Government department required for administration, but in it the cost of a large amount of research and investigation work was included. About £368,000 was used to maintain facilities overseas so that trans-Pacific air services could operate.

All this meant that for an annual expenditure of some £2,500,000, the country had a full meteorological service, maintained essential overseas communications, developed "backblock" areas, ran ground services without which the Air Force would be useless, maintained 70 firms in flying activity, and provided speedy transport for 480,000 people and some 90,000,000 lb of high-value cargo.

From New Zealand, also, comes further news of the world's first Agricultural Aviation Show, to be held at Palmerston North Aerodrome on November 9 and 10. Sponsored by the Aviation Industry Association of New Zealand, Inc., with the help of various commercial organizations and Government departments, it will display equipment and demonstrate techniques. Further information can be obtained from The Secretary, Agricultural Aviation Show, P.O. Box 614, Palmerston North, New Zealand.

### FORTHCOMING EVENTS

June 22-24. Royal Netherlands Aero Club: Air Tour of Holland.
June 23. R.N. Air Electrical School, Worthy Down, Winchester: At Home.
June 23. Elstree Flying Club: At Home and Flying Display.
June 23-24. Fiumicino Airport, Rome: Opening and Display.
June 24. Royal Netherlands Aero Club: Seventh Competition for Free Balloons, Nijmegen, Holland.
June 28-30. Aero Club of Massa Apuania: Air Rally.
June 29-July 1. Pescara Aero Club: Fourth Annunzio Trophy.
June 29-July 13. World Gliding Championships, St. Yan, France.
June 30-July 1. Aéro-Club de Basse Normandie: Ninth Air Rally.
June 30-July 2. Royal Aero Club: Private Rally, La Baule.
July 6-14. OSTIV: Sixth Congress, St. Yan.
July 7-9. Royal Aero Club: Private Rally, Deauville.
July 14-15. Aero Clubs of Trento and Bolzano: Eighth International Tour of the Dolomites.
July 14-15. Dusseldorf Aero Club: Air Rally.
July 14-25. International Gliding Competition, for the Coupe Jacques Coeu, Bourges.
July 15. Royal Belgian Aero Club: International Gliding Competition, Namur.
July 15. R.Ae.S.: Garden Party, Wisley.
July 18-22. Venice Aero Club: International Aeronautical Exhibition.
July 21. R.Ae.C.: National Air Races, Third Round (including King's Cup Race), Baginton, Coventry.
July 21. R.N.A.S. Lossiemouth: At Home:
July 21. R.N.A.S. Anthorn: At Home.:
July 22. Northamptonshire Aero Club: At Home.
July 22. Yorkshire Aeroplane Club: At Home.
July 28. R.N.A.S. Yeovilton: At Home.
July 28. R.N.A.S. Culdrose: At Home.
July 28-30. Livorno Aero Club: Air Rally.
Sept. 3-9. S.B.A.C. Display, Farnborough ("Public" days, 7th, 8th, 9th).

# Careers *are more* satisfying

**• • • where the projects are interesting**

## AVRO AIRCRAFT

*offers opportunities for these people—with or without aeronautical experience:*

Mathematicians
Computer Programmers
Aerodynamicists
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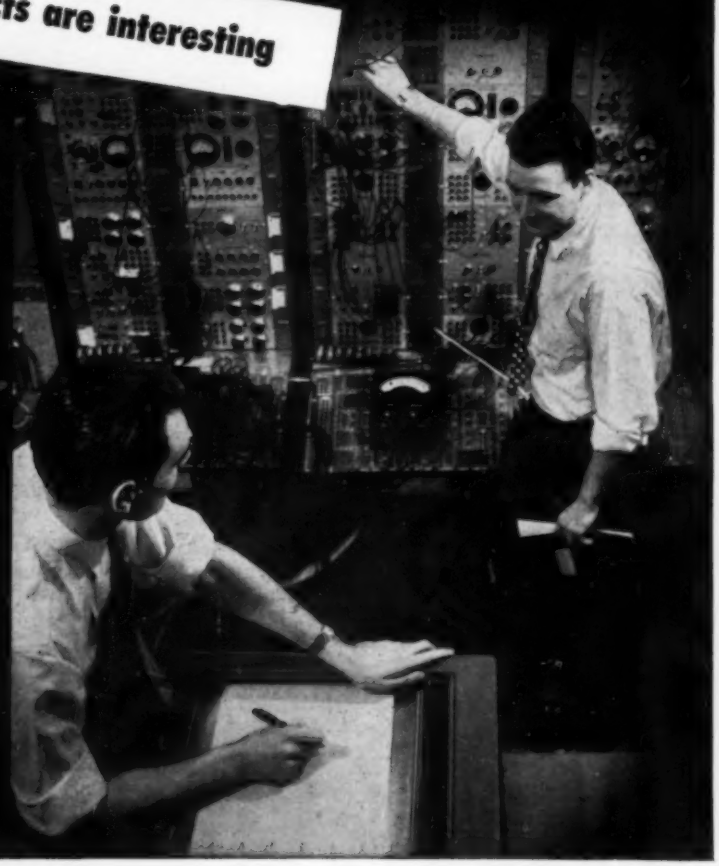
Stress Engineers • Systems Engineers • Mechanical Engineers
Flight Test Engineers
Controls Engineers
Aero Thermodynamicists
Vibration & Flutter Engineers
Civil Engineers for:
Structural Analysis, Tests, Design
Computing Specialists
Draftsmen & Technicians



Solving all aspects of aeronautical design provides you, as an engineer at Avro, with interesting and rewarding projects. You can further your career in a company where your talents are utilized and appreciated. At the same time, you enjoy the freedom of individualism and the power of teamwork. Your professional status and opinions are respected by your colleagues

A broad and diversified range of design projects at Avro offers you more scope to develop your capabilities. Among these are revolutionary approaches to powered flight which are unique in application.

Avro's CF-100 all-weather, night and day, rocket-firing twin jet interceptor is an example of what this engineering team has done. In coast-to-coast service with the R.C.A.F. in Canada and also scheduled for NATO in Europe later this year, the CF-100 is only the beginning. Under development are concepts representing the most advanced state of the art.

You can be a useful member of Avro's progressive design team—enjoy satisfaction and experience in the most advanced phases of aviation.

*WRITE TODAY TO:* T. W. SHAW, EMPLOYMENT MANAGER,

***AVRO AIRCRAFT LIMITED***

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MEMBER: A. V. ROE CANADA LIMITED & THE HAWKER SIDDELEY GROUP

***Temperature***

***control valve by***

# TEDDINGTON

Individual installations in an aircraft often require their own controlled heating.
The Teddington self-servoing temperature control valve regulates a supply of hot air in relation to the required delivery temperature, with an accuracy of ±2°C.
The temperature sensing element of this valve is a vibration-free bi-metallic probe which can either form an integral part of the valve, being then situated inside the downstream portion, or be remote from it and connected back by an external pipe.
Present production versions can withstand input temperatures and pressures up to 180°C. and 100 p.s.i. respectively. Subsequent designs will be capable of withstanding higher temperatures and pressures.

**TYPE FOW/A/1**

| | |
|---|---|
| Weight... ... ... ... | 1 lb. |
| Input Temp. (max.) ... | ... 180°C. |
| Input Pressure (max.) | 100 p.s.i. |
| Control Temp. setting | ... 80°C. |
| Control Accuracy ... | ... ±2°C. |
| Pipe Connections | 1" O.D. (beaded) |
| Dimensions ... | ... 9.25" x 3.75" |

Sensing element is internal

Teddington CONTROLS

REGD. TRADE MARK

TEDDINGTON AIRCRAFT CONTROLS LTD., MERTHYR TYDFIL, SOUTH WALES Telephone: Merthyr Tydfil 666,

London Office: COLNBROOK BY-PASS, WEST DRAYTON, MIDDLESEX. Telephone: Colnbrook 502-3-4

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Route your exports via KLM through your Freight Agent or KLM Royal Dutch Airlines, 21 Jockeys Fields, W.C. Tel: Mayfair 8803; and at Birmingham, Manchester, Glasgow and Dublin.

*New high-altitude protective clothing is tested by W/C. R. Beamont, as recorded below. The pressure jerkin has an offset zip fastener and the lifesaving waistcoat equipment is built into it. The central flap in the helmet below the visor facilitates eating or drinking.*

# THE INDUSTRY

## Pressure Clothing Under Test

TWO new items of high-altitude flying equipment are now being tested by W/C. R. P. Beamont, flight operations manager and chief test pilot of English Electric. They are the pressure helmet designed by the M.L. Aviation Co., Ltd., and a new pressure jerkin designed by P. Frankenstein and Sons, Ltd., in conjunction with the R.A.F. Institute of Aviation Medicine at Farnborough, Hants. W/C. Beamont has worn the new equipment during test flights in the Canberra P.R.9 and the P.1.

The purpose of the pressurized helmet and jerkin is to protect the pilot in case of cockpit pressure failure at altitudes above 50,000ft. Should normal pressurization fail at such heights his blood is likely to boil. The pressure jerkin prevents this hazard by balancing the respiratory pressure inside the helmet and by exerting a mechanical pressure on the pilot's torso. The pressure helmet consists of a plastic shell covering the top and sides of the head and the area of the jaw. A visor-type face-piece can be locked into position and sealed automatically and an adjustable sun visor is installed inside the helmet. The helmet shell is designed to give protection from impact.

## Bristol Tanks: Continental Licences

BRISTOL 100-gallon standard asbestos-phenolic plastic drop tanks are to be manufactured under licence in the Netherlands, under agreements concluded by Bristol Aircraft, Ltd., with the Fokker Company in Holland and the Société Anonyme Belge de Constructions Aéronautiques (SABCA) in Belgium.

The tanks, beginning with the 100-gallon type developed for use on Hunters, will be manufactured by Fokker and SABCA for the air forces of their respective countries, and Fokker hope to be in full production by the end of this year.

The 100-gallon Hunter tank is one of a range of standard plastic drop tanks developed by Bristol for use on British military aircraft. It has been flown on Hunters at supersonic speeds and is fully combat-rated. Standard tanks developed or under development by Bristol range in capacity from 50 gallons to 500 gallons.

## Smiths Appointments

TWO appointments have been announced by Smiths Aircraft Instruments, Ltd. Mr. J. S. Rivaz becomes technical sales manager in succession to Mr. A. I. O. Davies, who is leaving the company to emigrate to Canada, and Mr. D. G. Johnson has been appointed contracts manager. Mr. Rivaz, who is 37, was formerly technical services manager to Kelvin and Hughes (Aviation), Ltd., one of the Smiths Group of aviation companies. Mr. Johnson, 39, was formerly deputy technical sales manager and personal assistant to Mr. Leonard Morgan, director and general manager of Smiths Aircraft Instruments, Ltd.

*Mr. J. S. Rivaz (left), whose appointment as technical sales manager of Smiths Aircraft Instruments, Ltd., is announced above. (Right) Mr. D. G. Johnson, formerly deputy technical sales manager, who takes over as contracts manager of the same company.*

## Versatile Radar Simulator

A RADAR simulator has been developed by Mullard, Ltd., with the object of providing means of training G.C.I. controllers without the concomitant expense of flying aircraft and regardless of the vagaries of the weather.

The Mullard SL.21 (R.A.F. type 2292), as the simulator is styled, can represent twelve aircraft echoes, individually controlled, on a P.P.I. display. The movements of each echo are directed from individual "pilot panels" and their speed, direction and rate of turn are selected according to the requirements of the exercise. In addition the "pilot panel" shows a grid reference and range of the echo from the supposed location of the G.C.I. station. The effect of wind can be simulated in the display.

Signals from an actual G.C.I. station display can be fed into the simulator P.P.I. so that an actual and a simulated situation can be combined. This has obvious advantages during exercises, when special problems can be posed or lulls in air activity filled in. The estimated saving is such that it is claimed that the cost of a trainer could be recovered in one week. The Mullard SL.21 was developed for the R.A.F. but is now being made available for sale to overseas governments. It has applications, also, in the training of airport-approach controllers.

Particular attention has been paid to accuracy, reliability and adaptability of the simulator in order to provide the most realistic target indications and to permit easy maintenance. To allow for future aircraft performance a maximum speed of 1,000 kt and a rate of turn 30 deg/sec can be represented. Winds of up to 100 kt can be selected, and the maximum simulated range of the equipment is 200 nautical miles. The actual indicator units of existing radar systems may be used with the simulator. Allowance is made for presentation characteristics, which in operational radar sets vary according to such factors as aerial width, pulse length and aerial-rotation speeds. Artificial echoes similar to those found in operational radar equipment can be introduced. The simulator is also claimed to be suitable for the training of civil airfield and airways controllers.

*Mr. D. S. Stewart, who, as announced last week, becomes manager of Britannia production at Bristol Aircraft, Ltd. He succeeds Mr. F. J. Chard (right), who is to take managerial responsibility for "an important project under the defence programme."*

THE INDUSTRY . . .

# IN BRIEF

A firm whose 25th anniversary is commemorated by an article elsewhere in this issue, Air Service Training, Ltd., of Hamble, Hants, has announced the appointment of Mr. I. E. James as chief designer. He succeeds Mr. R. J. B. Woodhams, who has left the firm. Mr. James came to A.S.T., Ltd., from the Gloster Aircraft Co., Ltd., where he had been for 32 years, twenty-one of them as chief technician.

* * *

The Portable Electric Tool Manufacturers' Association is acting as host to the Federation of European Electric Tool Manufacturers' Associations for their annual international conference, which opens at St. Ermin's Hotel, Caxton Street, London, S.W.1, on June 27. Of foremost importance on the conference agenda will be discussions on the standardization of safety regulations as applied to portable tools. The conference inauguration will be under the chairmanship of Mr. C. U. Peat.

We regret to learn that Mr. Ernest Mather (55), chief inspector at the Woodford factory of A. V. Roe and Co., Ltd., died suddenly while on an outing of the Woodford senior staff council to Rhyl recently. Mr. Mather, who was chairman of the council's executive, joined Avro in the First World War as a welder, and so qualified to become a founder-member of the Avro 504 Club, which opened in 1952. He became an inspector in 1935, and in September 1941 was appointed chief inspector at Avro's Yeadon factory. With the closing of the Yeadon factory in 1946, he moved to Woodford.

* * *

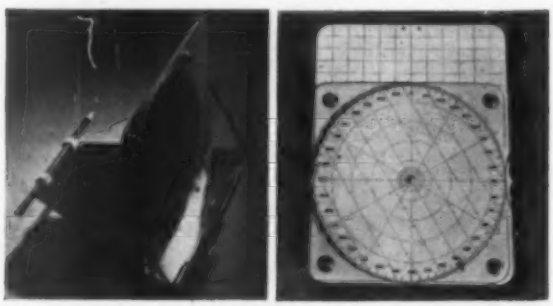
Axial-flow blowers made by Plannair, Ltd., are to be manufactured in France under an agreement with Societé Air Equipement, 18 Rue Basly, Asnières (Seine), who are manufacturers of air equipment and electric motors for the aircraft and electronic industries. Societé Air Equipement will make the full range of Plannair blowers not only for France and French territories but also for other European countries and Turkey. Plannair, who are specialists in blowers for both airborne and ground applications, have their offices, laboratories and factory at Leatherhead, Surrey.

## PILOT'S PLOTTING BOARD

DESIGNED by Short Brothers and Harland, Ltd., a new pilot's plotting board will be used in all Seamews now going into service with the Royal Navy and Coastal Command. It is also being installed in several types of British military aircraft now being exported, and enquiries have been received from overseas.

The new board consists of a single-leaf, double-faced ivorine 8½in × 7½in sheet, one side of which has a plain surface for briefing notes, the reverse side carrying a rotatable plot and a grid ruled area for log-keeping. It is attached by two spring-loaded arms to a metal back-plate which also carries expanding clips for pencil stowage and a hinge-pin for mounting the assembly in the aircraft.

When in use the board rests on the pilot's right knee, the second support serving as an attachment to the aircraft structure. By raising the near left-hand corner, the leaf can be "flipped" over with one hand to present either face.



*The Short plotting board from two viewpoints.*

In one particular aircraft installation the board hinge is slipped into a hinge casing containing a retaining spring. This casing is mounted at the rear end of a pivoted support-arm, the pivot at the front of the arm being attached to the starboard console. The arm is maintained in the operational position by a spring catch, and to stow the board and support arm it is only necessary to hinge the assembly through 90 deg and then push it down.

## A NEW LIGHTWEIGHT A.D.F.

THE Aircraft Radio Corporation of Boonton, New Jersey, U.S.A., has announced a new lightweight A.D.F. equipment, the units of which, including connectors, total only 19.1 lb in weight. Designated Type 21, the new unit is a three-band, superheterodyne receiver, complete with power unit, indicator, loop, loop housing and connectors, and is designed for use in all types of aircraft. It provides reception and localization of low-frequency ranges and broadcast stations transmitting at between 190 kc/s. and 1,750 kc/s. The loop assembly protrudes only 1.75in from the airframe skin and adjustment is provided to counteract errors in reading—of as much as 25 deg—caused by local distortion of the magnetic field about the airframe. Fourteen sub-miniature valves are used, operating well below their continuous rating, and all units are so assembled as to be easily accessible for servicing. The cut-out in the aircraft skin required for the loop mounting measures only 3.25in by 6in.

The power unit, included in the total weight, is a dynamotor which supplies the necessary D.C. at 120 volts and A.C. at 100 c.p.s. from the standard 28-volt aircraft supply. Its speed is regulated internally.

For the Type 21 the manufacturers claim reliability, low power-consumption and stability under adverse environmental conditions and power supply voltage changes. It can easily be accommodated in light aircraft or used as an additional aid in larger aircraft where space and power are limited.

## Mr. C. V. ALLEN

WE regret to learn of the death—at his home in Ashstead, Surrey, on June 2—of Charles Valentine Allen. With his passing another link with the early days of the British aircraft industry is broken.

By profession a solicitor, Mr. Allen was first secretary of the Society of British Aircraft Constructors. He was appointed on its incorporation in March 1916, at a time when his firm was advising several aircraft manufacturing companies.

Though he gave up the S.B.A.C. secretaryship as long ago as 1930, his experience of the industry's affairs was drawn upon to the advantage of the Society until only a few weeks before his death. He had, in fact, completed forty years as the Society's legal adviser.

He was prominently associated with the constitution in 1937 of the Air Registration Board, and since the last war had been active in establishing the co-operatively owned high-speed wind tunnel sponsored by the Society and operated by the Aircraft Research Association.

Mr. Allen, who was 73, leaves a widow, a daughter and three sons.

## SMALL AUTOPILOT

A NEW, compact non-electronic automatic pilot, designed for use in light or medium-weight private and business aircraft, has been flight-demonstrated by the Federal Telephone and Radio Company, New Jersey, U.S.A., a division of International Telephone and Telegraph Corporation.

The new autopilot is approximately the size of a portable typewriter and weighs only 17 lb. It consists of a small control unit, a gyroscope, small D.C. servo motors and a turn-and-bank indicator. Designated the FTR autopilot system, the equipment is available in two models, F200 and F300. The F200 weighs 17 lb, uninstalled, and is a two-axis unit for single-engined aircraft which have co-ordinated ailerons and rudder. It has a domestic list-price of $1,995 (about £712). The F300 model weighs 19 lb, uninstalled, and is a three-axis model for twin- or single-engined aircraft with unco-ordinated ailerons and rudder. It has a domestic list price of $2,325 (about £830). The installed weight of either model varies from approximately 21 to 25 lb, depending on the type of aircraft.

The FTR autopilot consists of a gyro-servo assembly, a control unit, and a turn-and-bank indicator. This system permits selection of roll or pitch stabilization, or both. It is also capable of being adapted to accept control signals from a radio coupler controlling both radio range and I.L.S. systems.

Ordinarily installed in the fuselage aft of the baggage compartment, the gyro-servo assembly is connected to a control unit mounted on the throttle pedestal or on the instrument panel. The gyro-servo unit is 15in long, 11½in wide and 16½in high. The control unit consists of a manual turn control, a manual pitch control, a manual "course-trim" control, and two on-off roll and pitch switches. These switches permit selection of roll or pitch stabilization individually or together. The control unit is only 4in wide, 3½in deep and 3½in high.

# CIVIL AVIATION

*Civil service: This Northrop YC-125A Raider bought by Triplay y Madera (Mexico) has been lightened by 3,000 lb and fitted with 1,350 h.p. Wright R-1320-56 engines to fly lumber and machinery out of and into a 4,500ft Mexican airstrip.*

## MOSCOW-LONDON MOVES?

MARSHAL ZHAVORONKOV, chief of Aeroflot, has reaffirmed Russian eagerness to reach agreement with Britain on a direct Moscow-London service operated with Tu-104s. The Marshal said during an Independence Day reception at the Egyptian Embassy in Moscow that he had received an invitation through Sir William Hayter, the British Ambassador, to visit Britain for discussions. He did not disclose whether he would accept. This invitation follows a similar one to General Zakharov, Aeroflot's deputy director (see last week's *Flight*), and the Soviet ban on "specially arranged flights" (*Flight*, June 8).

## BEIRUT-LONDON INAUGURATION

VISCOUNT OD-ACG of Middle East Airlines landed at London Airport last Monday evening (June 18) with a small cedar of Lebanon tucked away inside it. The tree was brought from Beirut for planting at the airport to mark the inauguration of the first Lebanese scheduled air service to Britain. In future M.E.A. Viscounts, with distinctive red lettering (both English and Arabic) and green cedar crests on nose and fin, should become familiar sights there, for the Beirut-London service is to be twice-weekly *via* Rome and (eventually) Paris. M.E.A. is an associate of B.O.A.C., with headquarters at Beirut.

## FLIGHT 52 OUT OF MIDWAY

I WAS recently able (writes *Flight* artist Arthur Bowbeer, subject of a note on page 795) to spend a two-hour period at Chicago (Midway) Airport. This must surely be the, or one of the, busiest airports in the world. Aircraft to be seen in quantity were T.W.A. Martins and Connies; Eastern Airlines Super Connies and Martins; United Air Lines DC-7s and modified Convair 340s with radar nose; and Delta Air Lines DC-7s (in smart blue livery), together with Convair 240s still bearing the name Delta-C & S. American Airlines were, of course, represented by numerous DC-7s and Northwest by Stratocruisers, DC-4s and 6Bs. To these may be added a colourful selection of DC-3s operated by North Central Airlines and Ozark Airlines, sundry special DC-3s with enlarged windows and wheel doors and—last but not least—Capital Viscounts. These last were whistling merrily to and fro at very frequent intervals.

Outside the passenger terminal are very large and expensive-looking advertisements by the major airline companies. Most impressive of these is for Capital's Viscount, as was shown in a photograph last week. This occupies the most commanding position, immediately opposite the outlet road from the terminal.

Talking with a Capital first-officer I learned that the aircrew are delighted with their Viscounts and that there have been very few cases of malfunction. He said, "The odd instrument goes out." Performance, climb, speed, flexibility, are a source of amazement to those who convert from piston-engined aircraft (in Capital's case Connies or DC-3s). This officer also said: "We seem to be getting a Viscount about every ten days," and "Before their introduction Capital carried five per cent of the traffic between Chicago and Washington—now we are the number one carrier" (percentage unavailable).

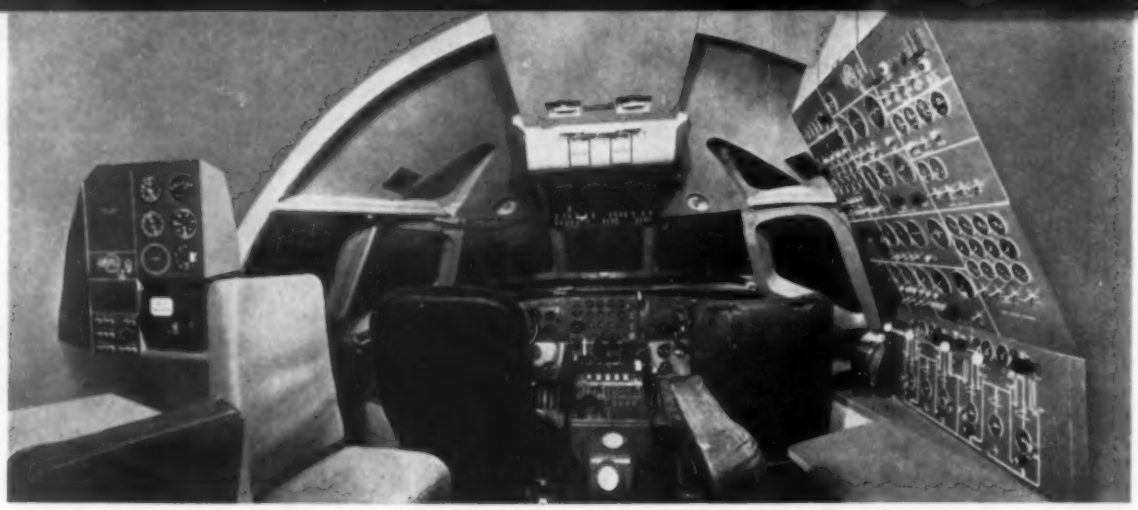
I was particularly interested to hear random remarks from passengers in the Viscount (bearing in mind that the generous supply of literature does not mention the origin of the aircraft). These included, "Say, this is a proper goldfish bowl," and "Ah, this is better, now we can see." Towards the end of the trip to Detroit and during the rapid descent from 15,000ft a lady passenger was heard to say: "This is a really nice aeroplane," and on arrival at Willow Run this same passenger remarked: "Forty-nine minutes! Are we here already?"

The two pretty stewardesses, who seemed to have little to do during this particular trip (the aircraft being only half full) assured me that the Viscount is far and away the most pleasant aeroplane in which they have flown. "It makes our job much easier," said one, "the lack of vibration seems to make our day far less tiring"; and she continued, "The passengers always seem happy and contented. We guess that's through lack of vibration, too."

My own observations on the operation of this particular flight (Flight 52 out of Midway at 0930 hr) were that Capital really used the maximum rate of climb of which the aeroplane is capable, and appeared, having adopted climbing power, to hold this in level flight. This may not be so, but my ears failed to detect any pitch change on levelling off. Duration of flight at the 15,000ft level already mentioned was, of course, short, but probably would have been quite impossible with Capital's other equipment.

Random observations: The Capital interiors seemed to be wearing well but the very lightweight seats have, in our eyes, a rather spindly, "unfinished" look. Capital crews (this one at any rate) have the pleasant habit of flying with the communicating door open, and my only adverse impression on looking through to the flight deck was that little provision had been made for standing a cup of coffee. While the weather on this occasion was quite calm this lack of cup-standing space had resulted in spilled coffee, which had to be cleared up by the stewardess; not quite the thing, one feels, that should happen in an expensive aeroplane.

*Representatives of the Association of British Travel Agents left London Airport on June 7 for the U.S.S.R. The first stage — to Copenhagen — was made by B.E.A. Viscount. Seen l. to r. are: Mr. George Fortune (A.B.T.A. vice-chairman), Mr. Richard Colmer (secretary), Dr. Stanton (council member), Mr. J. G. Bridges (director-general of the British Travel and Holidays Association), and Lord Gifford (A.B.T.A. council member). (Right) Mr. Robert F. Six, president of Continental Airlines, at the controls of a Bristol Britannia (see "Flight," June 15).*



*Points to note in this newly completed mock-up of the DC-8's flight deck are the pilots' roof windows, the "circuit-presentation" layout of the aircraft systems on the right, and the large direct-vision windows.*

## CIVIL AVIATION . . .

### AER LINGUS'S 20th BIRTHDAY

AER LINGUS recently celebrated the twentieth anniversary of its first scheduled flights. During the past 20 years the company has carried 2,562,000 passengers and 34,000 tons of freight, and more than 2,000,000 of these passengers have travelled over the last seven years. In the financial year just ended, 402,225 passengers travelled by Aer Lingus services and during the summer months 23,000 seats will be available on 550 scheduled flights weekly.

At Dublin Airport, the company's birthday celebrations were inaugurated by the Annual Blessing of the Fleet by the Very Reverend Canon Laurence Kelly, P.P., senior chaplain to Aer Lingus. The present fleet, consisting of four Vickers Viscount V.707s and 13 Douglas DC-3s, will be supplemented next year by three Viscount V.808s and four Fokker F.27 Friendships.

### FOG DISPERSAL IN THE COMMONS

LONDON Airport, where the lowest visibility for operations is 150 yd, was below the minima for more than one hour on 18 days last year, on 12 days in 1954, and 43 days in 1953. The respective aggregate number of hours were 117 hr, 60 hr and 200 hr. These facts were given on June 6 in a Commons reply by Mr. John Profumo, Joint Parliamentary Secretary to the Ministry of Transport and Civil Aviation. When asked the cost of installing Fido, Mr. Profumo said that the 1954 estimate, which should now be increased by about 15 per cent, was £335,000, annual standing charges being £74,000. The annual fuel cost assuming 1,000 burns with heavy-oil Fido, would now be about £160,000.

The possibility of installing Fido at L.A.P., Mr. Profumo assured, had not been completely ruled out, and experiments were to be carried out at a Royal Air Force Station to enable "more realistic assessments" to be made. Mr. Profumo said: "I should not like the House to believe that the present stage of Fido experiments could be regarded as wholly safe."

*Fifty representatives of twenty-two different Viscount operators gathered at Weybridge on June 5 to exchange ideas and to hear about new developments from the Vickers design team. This was the fourth such conference. Placards, from left to right in this corner of the proceedings, read: Fred Olsen Airtransport, Ltd., Hughes Tool Co., Inc., Continental Air Lines, and Capital Airlines.*

## BREVITIES

THE Air Registration Board announces that Sir George Cribbett, deputy chairman of B.O.A.C., has been appointed to serve on the Board in place of Sir Miles Thomas. There was "unanimous agreement" among British air operators with the appointment.

* * *

Work on Hong Kong's £7m new airport has been held up due to difficulties in dumping earth into the sea as a foundation for the new runway.

* * *

Eagle Aviation have been awarded an Air Ministry contract to operate a weekly trooping service between the U.K. and West Africa. The company will use its Viking "Troopmasters".

* * *

Hungary and Belgrade are now linked by the Rumanian airline TAROM, Belgrade radio reports. The Yugoslav company J.A.T. has just inaugurated a twice-weekly service to Milan.

* * *

Multi-channel airfield recording equipment by Simon Equipment (of the type installed last year at the R.A.E., Farnborough) has just been delivered to the Indian government. A second M.o.S. establishment—that at Thurleigh, Bedford—has just ordered this equipment.

* * *

Two films have been produced by I.C.A.O. to assist aircrew training. One depicts G.C.A. approach procedure, and the other illustrates an I.L.S. approach. Copies may be bought through I.C.A.O.'s offices in Montreal, Paris, Lima, Cairo and Bangkok, and are available with sound tracks in English, French or Spanish.

* * *

In future all Canadian aircraft flying on the airways at between 9,500 and 23,000ft will, according to the terms of a new Air Navigation Order, be subject to air traffic control direction in both V.F.R. and I.F.R. Hitherto, aircraft operating in V.F.R. have been free to operate without such restrictions.

* * *

Mr. C. O. Turner, general manager of Qantas, who has been in this country (see last week's *Flight*), said in London on June 14 that although the airline was considering the purchase of either DC-8s or 707s, it was "still interested" in the Comet 4 and the Britannia.

* * *

China's civil aviation has had an accident-free record during the past six years, it has been claimed in Peking. The Chinese news agency's report of the announcement gives no statistics, but states that traffic has increased ninefold since 1950.

*The Queen's first experience of Viscount travel was on June 17 when she returned from her visit to Stockholm in B.E.A. Viscount G-ANHC. From left to right in this picture are: Capt. William Baillie (B.E.A.'s chief flight manager), who was in command; Capt. Noel Barker; First Officer David Coleman; Radio Officer Thomas Rogers; Stewardess Edna Ward; Head Steward E. B. Horniblow; and Sen. Steward W. Anderson.*

No confirmation is forthcoming from Vickers-Armstrongs Aircraft of a newspaper report last week that the company is working on a design study of a 90-passenger jet airliner.

* * *

For the first time, Ireland was the venue for the annual conference of the Western European Airport Authorities, the eighth of which opened in Dublin Castle on June 4. Anxiety was expressed by delegates at the heavy cost likely to be involved in airport development to meet the requirements of jet operations, and concern was expressed at the lack of information made available to airport authorities.

* * *

Lufthansa have confirmed their order (*Flight*, March 30) for seven Viscount 814Ds, with an option on two more. With a new order announced on p. 798 this brings Viscount sales to 327.

* * *

PanAm are reported to have told the anti-trust sub-committee of the House of Representatives that the British Government have threatened to take over and impound Pan American airliners arriving in London with passengers paying lower than current fares. This allegation has been denied by the Ministry of Transport and Civil Aviation. News of progress at the I.A.T.A. fares conference at Cannes indicates that the European airlines have agreed in principle to the establishment of a third-class fare, but that it has not yet been decided when it can be introduced, or at what rate.

Jersey Airport is to carry out a £125,000 expansion programme. The main need is the accommodation of Jersey Airlines who now have seven Herons, and their offices are to be moved from St. Helier, the capital, to a new building at the airport. Hangar space is to be improved, and administration offices provided. It is planned also to accommodate B.E.A. in larger offices and generally to improve passenger handling facilities. Last year 382,931 passengers were handled, and there were 29,692 aircraft movements.

* * *

West Germany and Holland initialled on June 9 an agreement which allows Lufthansa to use Dutch airports for services to north west Europe, and north and central America. In return Holland retains her right to use German airports.

* * *

Early reports from Africa, where Britannia G-ALBO has just completed tests of the new Proteus engine modifications (*Flight*, May 18), indicate that the tests have been successful. The problem was a tendency to flame-out in conditions of heavy humidity. Bristol's deputy chief test pilot, Walter Gibb, said: "She took everything we could give her."

* * *

Between June 1 and June 9 Skyways Dakotas flew the British, Italian and Australian horse teams to Stockholm for the Olympic equestrian events. This was a contract requiring a good deal of careful management and skill; the horses of the British team were taxied around for three hours before take-off to accustom them to the aircraft, and were finally flown out with the windows blanked over so that they could not catch sight of their reflections, to which they apparently take exception. The contract was arranged by the air-broking firm of Gibsons.

# FROM THE CLUBS

ELSTREE Flying Club will be At Home tomorrow (Saturday, June 23) to visitors, who should be able to get a good idea of the Club's work from the static show and flying display which have been arranged. The latter (all being well) will include a demonstration of aerobatics, gliding, formation flying and a parachute drop. Also, there will be a "birthday celebration" for Auster G-AGXT, which has served four clubs at Elstree for ten years. The new Link Trainer will be operating; trial lessons and pleasure flights are to be available. Gates open at 2 p.m., the show begins at 3 and admission is on purchase of a programme (price one shilling). The Club point out that no children under 14 can be admitted unless in charge of an adult.

STATED to be the first all-metal aircraft built in Western Germany since the war, the BL-500 four-seat training and sporting machine began flight tests recently at Essen-Mulheim. Its designer is Prof. Walter Blume of Duisburg, former chief designer of the Arado company. The new machine is reportedly based on experience gained with the Arado Ar.79 of 1938, and series production at the Focke-Wulf works in Bremen is likely.

*The production Falco F.8 referred to in the adjacent news item.*

RECENTLY circulated is the first of a new series of newsletter of the Wolverhampton Aero Club, which logged 1,417 hr during 1955 and had achieved half this total during the first five months of this year. The club's new chief flying instructor is Ted Gibson, who is supported by instructors Ted Boyer, Frank Walters and Joe Bradley; their fleet now comprises three Austers and one Tiger Moth. The works flying club of the H.M. Hobson company have challenged the club to a navigation contest, details of which are now being worked out.

TWO Chipmunk aircraft are now owned by the Fair Oaks Aero Club. The machines were received in first-class condition but, as the club's newsletter puts it, "due to Ministry red tape and every form of obstruction yet devised by Civil Servants, it may be some months before they are issued with Certificates of Airworthiness and thus become available for flying." The aircraft are each fitted with a four-channel V.H.F. communications set. Now being established at Fair Oaks is a parachute club, under the supervision of John Beadle and Maj. "Dumbo" Willans.

A NEW version of the Falco F.8 designed by the Italian Stelio Frati and built by Aviamilano Costruzioni Aeronautiche, Via Macedonio Melloni, 70, Milan, made its first flight on April 25; the pilot was Ettore Wongi. A description, photograph and three-view drawing of the original aircraft appeared in *Flight* on July 22 last year.

The first machine was powered by a Continental 90 h.p. engine, but the latest Falco, which is to be standardized as the production version, has a Lycoming of 140 h.p. The fuselage has been lengthened by 7.2in and a number of unspecified refinements added. Airworthiness and performance trials are now being completed and firm orders for four machines are in process of execution. Ten Falcos, it is said, will be ready for delivery by the end of July. The price of six million Italian lire (about £3,370) includes blind-flying instrument panel, but not radio.

Principal data on the new F.8 are: span, 26ft 3in; length, 21ft 4in; empty weight, 1,010 lb; maximum weight, 1,540 lb; wing loading, 14.3 lb/sq ft; power loading, 11 lb/h.p.; maximum sea-level speed, 212 m.p.h.; normal sea-level cruising speed, 187 m.p.h.; stalling speed, 58 m.p.h.; full-load service ceiling, 21,300ft; normal range, with 30 min reserve, 620 miles; landing run, 459ft.

# INDEPENDENT ENTERPRISE

## *Otters and a Beaver in U.S.A. and Canada*

THE prerequisite of any successful new commercial venture is the offer of something better than that which previously existed. The introduction of a fifty-minute flight between Cleveland and Detroit, which makes use of water operation to save considerable time on the journey between business centres, has, not surprisingly, been received with enthusiasm by businessmen of the two cities.

This enterprise was recently inaugurated by Mr. Edward T. Knight and Mr. Edgar H. Eklund, respectively president and vice-president of the newly formed Taxi Air Group Inc. T.A.G.—their emblem boldly displayed on the rear fuselages—operate a ten-seater de Havilland Otter and a five-seater D.H. Beaver floatplane (the first in use by a U.S. commercial operator) on four flights a day from the seaplane base in the Detroit river over Lake Erie to the Cleveland Lakeshore Airport. This route represents a considerable saving in the surface mileage that has to be covered, and avoids the journey time from outlying airports. If sufficient demand arises, Toledo will be included in the T.A.G. schedule, and other water-based services of this type are obviously possible for similar cross-water journeys.

Time-saving for businessmen is not the only service an independent operator can provide. Max Ward, president of Wardair, Ltd., has progressed (from a one-man one-Fox Moth service) to become the operator of three D.H. Otters and a Beaver. This he has achieved by his experience of the region bounded by the Rocky Mountains, the Arctic Ocean, the District of Keewatin and the 60th parallel, and by the provision of aircraft suitable for transporting prospecting parties and equipment for mining camps to places as far north as Shepherd Bay, which lies within 140 miles of the Magnetic Pole.

Although operations are confined to V.F.R. conditions, implying limited winter operations, Wardair Otters achieve a utilization of 1,000 hours per year, and the Beaver 600 hours. The company's revenue-load capacity is now nearly 400,000 ton-miles per year at tariffs equivalent of 6s 7d per mile for the Otter and 4s 7d per mile for the Beaver.

Operations at temperatures of 68 deg below zero have been mastered by the use of split wooden discs fitting over the nose-opening to seal the cowlings, and Herman Nelson heaters and canvas airframe and engine tents. By these means even overhauls can be carried out in extreme sub-zero conditions.

*Canada: The Wardair Otter fleet referred to below.*

*America: The D.H. Otter of Taxi Air Group in flight over Detroit.*

## AUSTRIA'S EMPTY TRANSPORT SCENE

AUSTRIA finds itself in the odd position of having new airports with no airlines wanting to use them. At the beginning of the year it appeared certain that a new airline, Austrian Airways, would be formed in Vienna with the backing of S.A.S. (*Flight*, April 6), and another airline, Air Austria, had also been established with K.L.M.'s backing (*Flight*, January 20). Since then, however, a general election has been held; Austrian Airways was originally backed by the Socialists, while Air Austria was supported by the Conservatives; these two parties had almost equal strength, but as a result of the election there is now a coalition of the two parties. Some sort of compromise airline may result, but the whole question of Austrian civil aviation seems to be rather a touchy one in Vienna at the moment.

One of the new airports is at Graz, second city of Austria. It is now completed, with a 1,640 yd paved runway. Six miles from the city, it is called Thalerhof, but no airline has considered using it as yet and its modern terminal buildings echo emptily to the occasional footfalls of a skeleton staff. At the end of the runway lie some of the largest hangars in Europe, built by the Luftwaffe towards the end of the war. Inside these vast edifices, like ants in a matchbox, sit two small flying-club machines.

## ARTIST AND R.A.F.

LAST year Pamela Drew (Lady Rathdonnell of Lisnavagh) spent about three months in the Middle East and Kenya making a pictorial record of the R.A.F.'s activities in those areas. She visited Cyprus, Aden, Port Sudan, British Somaliland, Jordan, the Canal Zone and Kenya, and the results of her travels can be seen in a London exhibition open to the public (admission free) until July 1. The exhibition (at the Imperial Institute, South Kensington) was opened on June 8 by the Chief of the Air Staff, Air Chief Marshal Sir Dermot Boyle.

The C.A.S. spoke of his pleasure at being asked to open the exhibition and at meeting the artist again: she had been the only artist to paint the R.A.F.'s Coronation review in 1953, and she was one of those people who seemed to get everyone interested in her work. She had flown in some 14 different types of aircraft during her tour.

The exhibition, which numbers 122 works, is of great variety, and whilst the emphasis is upon aircraft, the artist does not overlook the vital work of the ground forces: there are also some impressive portraits. Pamela Drew has used both oils and pastels for her interpretations of R.A.F. life—and these cover a wide range of activities, such as flight servicing, forest patrols, aircraft refuelling and re-arming and tracker-dog searches.

*As reported in "Flight" last week, Vickers-Supermarine F.R.5 fighter/reconnaissance aircraft are now established in service with 2nd T.A.F.*

# SERVICE AVIATION

*Royal Air Force and Fleet Air Arm News*

## Manby's Double Occasion

THE annual reunion dinner of the R.A.F. Flying College was held this year on June 14, and was unusual in being preceded by a naming ceremony to introduce into service the latest *Aries*. On the tarmac were drawn up the retiring Canberra B.2 *Aries IV* and the new *Aries V*, a P.R.7 numbered WT 528—the self-same machine in which Captain Hackett and Mr. Moneypenny established their records between London and New York.

Before the christening, the Commandant of the College, A. Cdre. G. A. Walker, C.B.E., D.S.O., D.F.C., A.F.C., A.D.C., gave a brief history of the previous *Aries*. *Aries I* was a Lancastrian which in 1944 established a new London-Cape Town record during a 40-day round-the-world flight, and the following year flew over the North Geographical and Magnetic Poles. *Aries II* was a Lincolnian, which covered more than 70,000 miles in the course of its duties: and *Aries III* was a Lincoln 2, the first aircraft to be operated from the newly established Flying College, in 1950, and the holder of the London-Khartoum record. *Aries IV*, Canberra WH 699, was the first jet of the series, and made many flights into the Arctic and Polar regions, as well as establishing new records between London and Cape Town, and between Ottawa and London.

Last Friday, after these events had been recalled by the Commandant, the new aircraft was dedicated by the unit Chaplain, the Rev. J. A. Hanson, and was then named with the traditional bottle of champagne by Lady Boyle, wife of the Chief of the Air Staff.

In the evening, the annual reunion dinner was held, coinciding in time with the passing out of No. 7 Course (the second of the six-month courses), and of No. 14 "Spec N" Course. The C.A.S. was unavoidably absent due to two consecutive Cabinet Meetings to which he was called at the last moment; but other distinguished visitors included the Air Member for Personnel, Air Chief Marshal Sir Francis Fogarty; Vice-Admiral Caspar John; Air Marshal Sir Thomas Pike; Air Marshals T. N. McEvoy and R. L. R. Atcherley; and A.V-M. A. McKee, the first Commandant of the College. Representing English Electric, Ltd., was Lord Caldecote, D.S.C., and from Rolls-Royce, Mr. J. D. Pearson. Capt. Hackett and Mr. Moneypenny were unavoidably absent, for they were delivering a Canberra to Peru: but a telegram from them was read.

In his address, Air Commodore Walker outlined the activities of the College during the preceding year, and expressed appreciation to the members of the Air Council present, for their support when the future of Manby was at stake some 15 months previously. He was able to say that the shorter courses (six months instead of a year) had proved successful, and the standards obtained had been as high as ever, notably in flying, where hours-per-pupil were still the same as before. This was because a jet green instrument rating was not mandatory before reaching Manby, and hence only short conversion courses were needed at the College. The higher flying hour density had proved a definite advantage in the new shortened courses, and—although the overseas flights were not "out"—special flights still went on regularly, and the pool of knowledge already obtained was proving of great and increasing benefit to both the military and civil aviation authorities. A. Cdre. Walker also stressed the happy relations prevailing between the Service and industry.

In his reply on behalf of the guests, Air Chief Marshal Fogarty congratulated the Commandant on his recent award of the A.F.C.—an unusual award at Air Officer level—and stressed the importance he himself attached to course officers for Manby being suitably posted once the College was (and must be) a main graduation stage to senior positions in the R.A.F. The official proceedings then closed with two further, mainly humorous, speeches from the Chief Instructor, G/C. Embling, and from G/C. J. H. Giles, on behalf of No. 7 Course.

*Personnel engaged in Exercise Hour Glass (see news item on the right): W/C. D. Lindsay, O.B.E., D.F.C. (centre), with (left to right) F/O. P. J. Sunnucks, F/L. D. Hanmore, F/L. D. Helsby, F/L. J. M. Ilsley, F/L. G. Finding, and F/L. G. H. Burden.*

## Armament at Fassberg

MEMBERS of the Armed Services of ten nations watched a notable armament demonstration on the ranges at Fassberg on June 12. They saw in action Venom F.B.4s of No. 266 Squadron, Fassberg, Vickers-Supermarine F.R.5s of No. 2 Squadron, Geilenkirchen, Republic F-84Gs and F-84Fs of the Royal Netherlands Air Force (from Eindhoven and Volkel), and Hawker Hunters from Oldenburg and Jever. No. 26 Squadron Hunter aerobatic team from Oldenburg gave a display, and F/L. Goodwin performed solo in a Hunter of No. 118 Squadron, Jever. Observers witnessed the devastating effect on ground targets of four 30 mm Aden guns.

## Exercise Hour Glass

SIX Lockheed Neptune maritime-reconnaissance aircraft of No. 36 Squadron (W/C. D. S. Lindsay, O.B.E., D.F.C.), R.A.F. Coastal Command, based at R.A.F. Topcliffe, Yorkshire, are taking part in Hour Glass, a large-scale anti-submarine exercise in the Western Atlantic from June 12-27. They are operating with the British and Netherlands Royal Navies, the R.C.A.N. and the United States Navy, on anti-submarine work and convoy escort duties. Later the detachment will fly from Kindley Field, Bermuda, 1,000 miles to the R.C.A.F. station at Greenwood, Nova Scotia. There, airmen from both sides of the Atlantic will meet and discuss general tactics operative in their different theatres. Their return flight—as on the outward journey—will be made in two hops, with an overnight stay in the Azores. The Neptunes are due back in England on July 6.

A Hastings of R.A.F. Transport Command is carrying ground technicians.

# SERVICE AVIATION . . .

## R.A.F. Appointments

THE following are among recent Royal Air Force appointments: A. Cdre. J. F. Hobler, C.B.E., as Air Officer in Charge of Administration, Middle East Air Force, with the acting rank of air vice-marshal with effect from July 1956; A. Cdre. F. W. Felgate, C.B.E., as Senior Air Staff Officer, Maintenance Command, with the acting rank of air vice-marshal; G/C. D. F. MacDonald, as Director of Postings (A) at Air Ministry, with the acting rank of air commodore; G/C. D. Finlay, C.B.E., as Director of Personal Services (A) at Air Ministry, with the acting rank of air commodore.

Other recent appointments are: —

G/C. T. E. Burgess to Headquarters, No. 40 Group, for air staff duties; G/C. J. B. Conolly to Air Ministry for duty in the Department of the Air Member for Supply and Organization; G/C. W. L. Houlbrook, O.B.E., to Air Ministry for duty in the Department of the Air Member for Supply and Organization; G/C. R. J. Rackham to H.Q., Technical Training Command, for air staff duties; G/C. J. L. Crosbie, O.B.E., to Headquarters, 18 Group, as Senior Air Staff Officer; G/C. J. S. Laird, O.B.E., to R.A.F. Ballykelly, to command; G/C. H. M. Russell, O.B.E., to Ministry of Supply; G/C. F. W. Stannard, to R.A.F. Uxbridge, to command; G/C. J. A. C. Stratton, C.B.E., to Headquarters, 81 Group, as Senior Officer Administration; G/C. M. H. Rhys, A.F.C., to Central Flying School (Basic), R.A.F. South Cerney, to command; G/C. W. H. Tremear to Air Ministry, for duty in the Department of the Chief of Air Staff; G/C. R. A. J. Horne to Headquarters, Flying Training Command, for administrative staff duties; G/C. A. Pyke, O.B.E., to R.A.F. Winthorpe, to command; G/C. H. G. Leonard-Williams, C.B.E., to Headquarters, 90 Group, for technical staff duties.

W/C. J. Avent, D.F.C., to Air Ministry, for duty in the Department of the Chief of Air Staff (with acting rank of group captain); W/C. A. W. Caswell, O.B.E., to R.A.F. Cosford, for technical duties (with acting rank of group captain); W/C. J. R. Whelan to Headquarters, Coastal Command, for administrative staff duties (with acting rank of group captain); W/C. W. R. Ford to Air Ministry for duty in the Department of the Air Member for Supply and Organization (with acting rank of group captain); W/C. W. M. Lyons to Headquarters, Home Command, for administrative staff duties (with acting rank of group captain); W/C. J. W. White, M.B.E., to Headquarters, No. 1 Group, for technical staff duties (with acting rank of group captain); W/C. D. W. J. Brown to Headquarters, 66 Group, for administrative staff duties; W/C. J. Butterworth to Air Ministry, for duty in the department of the Air Member for Personnel; W/C. The Hon. D. H. T. Dowding to R.A.F. St. Eval, for administrative duties; W/C. A. M. Gill, D.F.C., to No. 23 Maintenance Unit, for command; W/C. H. S. Gibbs to Headquarters, Maintenance Command, for air staff duties; W/C. L. Hornabrook to Headquarters, Maintenance Command, for administrative staff duties; W/C. F. D. Hughes, D.S.O., D.F.C., A.F.C., to Air Ministry, for duty in the Department of the Chief of Air Staff; W/C. L. H. Moulton, D.F.C., to Headquarters, Bomber Command, for technical staff duties; W/C. L. Rose to Ministry of Supply; W/C. A. Stevenson, O.B.E., to Air Ministry for duty in the Department of the Chief of Air Staff; W/C. O. J. Wells to Headquarters, Bomber Command, for air staff duties; W/C. A. R. Wright, D.F.C., A.F.C., to Headquarters, Metropolitan Sector, for air staff duties; W/C. M. H. Constable-Maxwell, D.S.O., D.F.C., to the Oxford University Air Squadron, to command; W/C. W. Edwards, to Headquarters, Flying Training Command, for technical staff duties; W/C. J. A. Hemingway, D.F.C., to R.A.F. Duxford, for flying duties; W/C. V. C. Jarvis, O.B.E., to Headquarters, Maintenance Command, for technical staff duties; W/C. R. A. S. Ritchie to No. 1 Movement Unit (Embarkation), to command; W/C. W. W. T. Ritchie, O.B.E., A.F.C., to Headquarters, 90 Group, for administrative staff duties; W/C. G. L. Sinclair, D.F.C., to Headquarters, Northern Sector, for air staff duties; W/C. F. B. Sutton, D.F.C., to R.A.F. North Weald, for flying duties; W/C. E. D. Crew, D.S.O., D.F.C., to Air Ministry, for duty in the Department of the Chief of the Air Staff; W/C. F. W. Dewell, A.F.C., to R.A.F. Watnall, to command the Air Traffic Control Centre; W/C. C. J. G. Ferguson to No. 113 Maintenance Unit, Middle East Air Force, to command; W/C. F. J. Mowbray to Headquarters, Allied Air Forces Northern Europe, for staff duties; W/C. F. A. B. Tams, O.B.E., to R.A.F. St. Eval, for administrative duties; W/C. J. G. Topham, D.S.O., O.B.E., D.F.C., to Headquarters, No. 11 Group, for air staff duties.

W/C. F. T. Baynham to Air Ministry for duty in the Department of the Air Member for Supply and Organization; W/C. I. C. Jackson, D.F.C., to Air Ministry for duty in the Department of the Air Member for Supply and Organization; W/C. W. G. Morgan, O.B.E., to the R.A.F. Staff College, Andover, for directing staff duties; W/C. A. P. B. de Mornay to Headquarters, Middle East Air Force, for administrative staff duties; W/C. A. J. Wild to Royal Air Force Honington, for technical duties; W/C. D. A. Birkett to Air Ministry, for duty in the Department of the Air Member for Personnel; W/C. C. D. Burrill to R.A.F. Henlow, for administrative duties; W/C. R. V. B. Franklyn to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; W/C. J. M. Littler to Headquarters, No. 63 Group, for administrative staff duties; W/C. T. P. Worthing to R.A.F. Castle Bromwich, for administrative duties; W/C. E. I. Elliott to command Headquarters Wing, Aden Protectorate Levies (retaining acting rank of wing commander); W/C. H. L. E. Watson to R.A.F. Henlow, for technical duties (retaining acting rank of wing commander); W/C. H. E. Angell, D.F.C., to No. 22 Maintenance Unit to command; W/C. C. F. Babbage, D.F.M., to R.A.F. Stradishall, for administrative duties; W/C. D. R. Biggs, D.F.C., to R.A.F. Henlow for administrative duties; W/C. R. S. Boast, D.F.C., to R.A.F. Gaydon as Chief Ground Instructor; W/C. M. Booth, D.F.C., to Ministry of Supply; W/C. E. R. Berry, to Headquarters, Coastal Command, for administrative staff duties; W/C. O. Gradon, O.B.E., to the British Joint Services Mission, Washington, for administrative staff duties; W/C. R. Hill to Air Ministry, for duty in the Department of the Air Member for Supply and Organization; W/C. H. V. Hoskins, to Headquarters, 2nd Allied Tactical Air Force, for administrative staff duties; W/C. J. W. Lovell to the Royal Australian Air Force for exchange duties; W/C. T. C. Pratley to R.A.F. Wunstorf for technical duties; W/C. F. W. T. Pryer, O.B.E., to Headquarters, Fighter Command, for administrative staff duties (instead of to Air Ministry as announced); W/C. E. P. Appleton to Headquarters, Allied Air Forces Central Europe, for staff duties; W/C. H. G. Belcher to Headquarters, No. 40 Group, for administrative staff duties; W/C. J. R. Denny, M.B.E., D.F.C., to the Officers' Advanced Training School, Bircham Newton, to instruct; W/C. H. R. Edge, A.F.C., to Headquarters, No. 25 Group, for air staff duties; W/C. H. Grant, A.F.C., to R.A.F. North Front, Gibraltar, to command; W/C. R. F. Harman, D.F.C., A.F.C., to the R.A.F. Flying College, Manby, for directing staff duties; W/C. J. S. Higgins, D.F.C., A.F.C., to R.A.F. Bahrein, to command; W/C. G. S. W. Kerslake, M.B.E., to Headquarters, Far East Air Force, for technical staff duties; W/C. C. S. Pattison to R.A.F. Laarbruch, for technical duties; W/C. E. M. H. Slade, A.F.C., to Air Ministry, for duty in the Department of the Chief of Air Staff.

*G/O. Jean Conan-Doyle, the new commanding officer of R.A.F. station Hawkinge, chatting with Women's Royal Air Force personnel. G/O. Conan-Doyle succeeds G/O. M. H. Barnett (now Director of the W.R.A.F.).*

## Fleet Air Arm Appointments

THE following Fleet Air Arm appointments are announced by the Admiralty: —

Rear Admiral M. L. Power, C.B., C.B.E., D.S.C., as Flag Officer Aircraft Carriers; Capt. A. J. T. Roe, D.S.O., O.B.E., for loan service with the Royal Australian Navy as Fourth Naval Member (granted acting rank of Commodore, 2nd Class); Capt. H. C. N. Rolfe to R.N.A.S., Ford, in command; Capt. F. Stovin-Bradford, D.S.C., to R.N.A.S., Brawdy, in command; Capt. T. G. C. Jameson to R.N.A.S., Eglinton, in command; Cdr. C. B. Lamb, D.S.O., D.S.C., to R.A.F. Old Sarum as Assistant Commandant (Navy) of the School of Land/Air Warfare; Cdr. B. S. McEwen to Staff of C.-in-C. Mediterranean as Fleet Aviation Officer; Cdr. C. J. Cunningham, D.S.C., to R.N.A.S., Lossiemouth, as Commander (Air); Lt-Cdr. H. P. Allingham to 750 Squadron, in command; Lt-Cdr. W. J. Cooper to H.M.S. *Albion* as Lt-Cdr. (Operations); Lt-Cdr. P. R. House, for duty with British Joint Services Mission, Washington; Lt-Cdr. T. V. G. Binney to R.N.A.S., Lee-on-Solent, as Officer-in-Charge of Junior Officers' Air Course; Lt-Cdr. J. D. Treacher to H.M.S. *Protector* as First Lieutenant; Lt-Cdr. E. T. Genge as Flag Lt. and personal pilot to the Admiral (British Joint Services Mission, Washington); Lt-Cdr. L. D. Urry to 824 Squadron, in command; Lt-Cdr. J. M. Jones to 895 Squadron, in command; Lt-Cdr. R. D. Lygo to staff of Flag Officer, Flying Training; Lt-Cdr. R. H. Reynolds, D.S.C., A.F.C., to H.M.S. *Jamaica;* Lt-Cdr. D. M. Steer to H.M.S. *Albion* as Lt-Cdr. (Flying); Lt-Cdr. I. H. F. Martin, D.S.C., to the Aircraft Handling Squadron at Boscombe Down.

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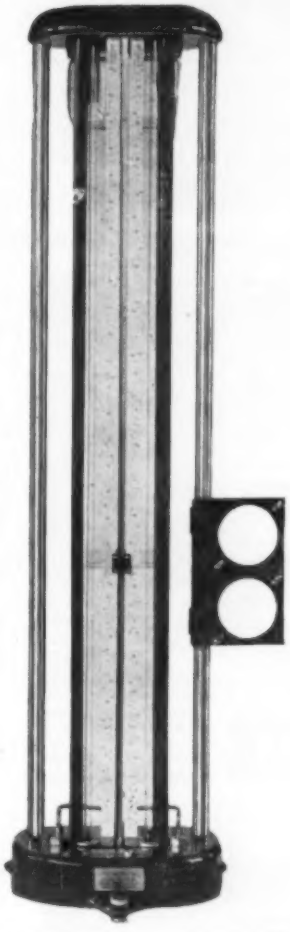

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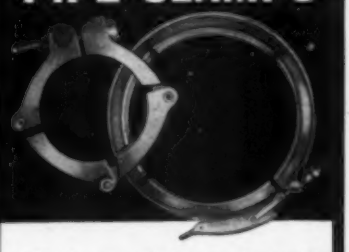

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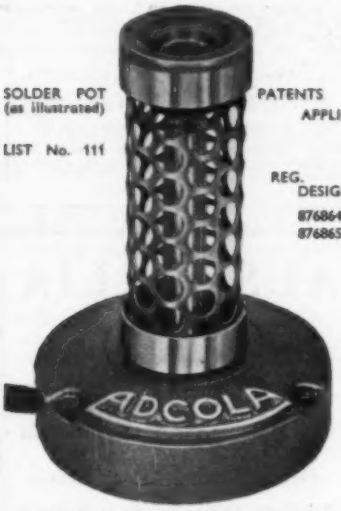


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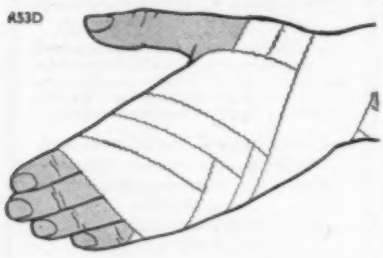

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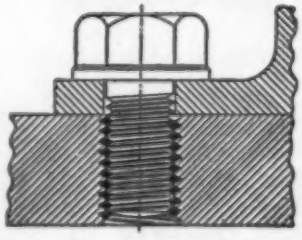

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FURTHER particulars and application forms may obtained from the Registrar, to whom completed forms should be returned as soon as possible. [5408

TEST and Laboratory Engineers required for gyro and electro mechanical instruments. Apply stating age, experience and salary required to S. G. Brown, Ltd., Shakespeare Street, Watford, Herts. [0147


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The company can offer:—

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**Canbury Park Road, Kingston-on-Thames, Surrey.**



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# VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED

**HURN DEPOT,**
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have vacancies for Draughtsmen (Senior, Intermediate and Junior), Technicians and Weights Engineers on Viscount Aircraft development and new project design work covering:

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Aircraft experience desirable but not essential.

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(b) Are in possession of an Ordinary National Certificate, and

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Applications, quoting date of advertisement, to: **Employment Manager, Vickers-Armstrongs (Aircraft) Limited, Hurn Depot, Nr. Bournemouth, Hants.**

Holidays already arranged by applicants for this year taken into account.

# MARSHALL

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## Aircraft Inspectors

**[required**

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Applications for these vacancies can only be considered from those with recent experience on Multi-Jet and Turbo-Prop Aircraft.

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**Including Contributory**
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Comfortable Hostel accommodation available for initial probationary period, or if preferred private lodgings near works can be arranged.

Written applications giving full particulars of experience, etc., should be addressed to

**EMPLOYMENT OFFICER**

## SITUATIONS VACANT

### THE SUPERMARINE WORKS OF VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED

OUR Flight Test Section, which is situated at Wisley Airfield in Surrey, have vacancies for aeronautical engineers to deal with the flight testing of new fighter aircraft. Applicants should have a degree or H.N.C. in aeronautical engineering; some experience in similar work or aerodynamics would be an advantage, but is not essential.

THERE are also vacancies for male or female junior technicians who should have some engineering or scientific training.

APPLY to the Personnel Manager, Vickers-Armstrongs (Aircraft) Limited, Supermarine Works, Hursley Park, Nr. Winchester. [5400

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**Electrical**

**DRAUGHTSMAN**

**required**

**in**

**LONDON**

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**SUBSTANTIAL SALARY**

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FERRANTI, LIMITED, Edinburgh, have two vacancies for Air Traffic Controllers with A.C.R. experience. Additional qualifications will be: (a) Experience on a joint-user airfield, (b) Experience as a pilot or navigator, (c) The possession of a university degree. It will be necessary for the successful applicants to obtain an M.T.C.A. certificate of competence, if they do not already hold this. A salary appropriate to responsibility involved will be offered. Applicants are invited to write, giving details of their careers to date, to the Personnel Officer, Ferranti Limited, Ferry Road, Edinburgh, 5, quoting Ref. ATC/TID/29. [5386

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### SENIOR DEVELOPMENT ENGINEERS (ELECTRICAL AND MECHANICAL)

Qualified engineers with experience on Relays, Solenoids, Rotaries, Printed Circuit Connectors, etc., etc., required in a factory in East Anglia, engaged in manufacturing electrical components.

The opportunity is exceptional for anyone with ability and initiative able to accept responsibility.

Good salary and excellent prospects.

Applications in writing in strictest confidence, stating age, qualifications and salary required to Box No. 2416. [5374

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### RADIO OPERATOR/TECHNICIAN

THERE is a vacancy at Woodford Aerodrome, Cheshire, for a Radio Operator for Aircrew duties on Flight Test Work. Applicants should possess a current P.M.G. Radio Operator's Licence and should be capable of working on the installation of the various types of radio and radar equipment fitted in the present-day aircraft. Applications giving full particulars of previous experience, age, etc., should be addressed to the Personnel Manager, A. V. Roe & Co., Ltd., Greengate, Middleton, Manchester. [5338

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EAGLE AIRCRAFT SERVICES, LTD., require the following personnel:—

INSPECTORS, preferably with "A" and "C" licences on Viking and Dakota.

STOREKEEPER (with aircraft experience).

SKILLED airframe fitters. Skilled engine fitters.

SKILLED instrument fitter. Planning engineer. Licensed radio engineer (aircraft). Skilled hydraulic fitter. Detail fitters. Aircraft electrician.

APPLY, Personnel Officer, Personnel Department, Blackbushe Airport. Telephone, Yateley 2371. [5401

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GROUND Engineer required. State full particulars and licences to Bristol and Wessex Aeroplane Club, Bristol Airport. [5403

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WANTED. Works Manager. Preferably licensed. Electrical and ancillary overhaul workshops. Full details. House available. Surrey. Box 2113. [0976

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WANTED. Licensed Chief Inspector. Experienced Dakota and ancillaries. House available. Surrey. Box 2114. [0977

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COMMERCIAL Pilot with Auster endorsement wanted for summer season (mostly pleasure flying). Apply with details of flying experience to Box No. 2442. [5393

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*have vacancies for*

# TECHNICIANS

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**AT**

## WOODFORD AERODROME

## CHESHIRE

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5. **LABORATORY INSTRUMENTATION**—experience in instrumentation for structural test work, holding Higher National Certificate.
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***STRUCTURES ANALYSIS***

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9. **PROJECT STRESS AND THERMOELASTICITY**—Senior Stressmen required, holding Higher National Certificate as a minimum qualification.
10. **WEIGHT CONTROL ENGINEERS**—experienced men required, holding Higher National Certificate.

***DRAWING OFFICE***

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*Working conditions are exceptional and good salaries will be paid to suitably qualified people.*

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## SITUATIONS VACANT

WANTED Q.F.I. for Meteors and a Staff Pilot for Venom and Attacker aircraft. Apply Chief Pilot, Airwork Limited, Royal Naval Air Station, St. Davids, Haverfordwest, Pembs. [5385

AIRCRAFT section leader design draughtsman required. Salary according to age, experience and qualifications up to £900 per annum. Pension scheme/superannuation fund in operation. Write or Phone: BAYNES AIRCRAFT INTERIORS LIMITED, Langley Aerodrome, Bucks. Telephone: Langley 451. [0476

DRAUGHTSWOMEN required by Aircraft Equipment Company in South Bucks. Salary according to age and experience, up to £13 per week. Apply to Box No. 1775. [0475

JUNIOR Detail Draughtsman required for Aircraft Component Development. Aircraft experience preferred but not essential. Reply in writing to: King Aircraft Corporation, Fifth Street, Montrose Ave., Hillington, Glasgow, S.W.2. [0421

TECHNICAL Representative. In connection with well-known riveting process used in all trades. Write giving details of age, experience and salary required to Box V957, c/o Streets, 110, Old Broad Street, E.C.2. [5310

FIRST Officers required for service in Beirut. Minimum qualification C.P.L. Instrument Rating, Group II Hermes. Good pay and allowances, rebate travel facilities. Apply Staff Manager, A.B.A. (ME), Ltd., Stratton House, Stratton St., London, W.1. [5376

BOULTON PAUL AIRCRAFT, LTD., Wolverhampton, have vacancies for senior and junior aerodynamicists to work on an interesting research programme. Apply giving details of experience to Personnel Manager. [5397

ASSISTANT to Chief Technician required by aircraft equipment company in Home Counties, preferably with shop and stressing experience and aeronautical H.N.C. (or equivalent). Salary: £900 to £1,000. Apply to Box No. 2430. [5384

SENIOR stressman required for Brighton design office of Airwork, Ltd. Write in first instance, giving details of experience, to Chief Designer, Airwork, Ltd., Gatwick Airport, Surrey. [5411

FIRST Officers required for Arab Airways, Amman. Minimum qualifications C.P.L. Instrument Rating, Dakota Group II. Good salary, pension scheme, free accommodation, no income tax, rebate travel facilities. Apply Staff Manager, A.B.A. (ME), Ltd., Stratton House, Stratton St., London, W.1. [5375

BOULTON PAUL AIRCRAFT, LTD., Wolverhampton, have a vacancy for an Engineer, preferably a graduate with experience in aerodynamics, to be responsible for conducting an interesting research programme. Apply giving details of experience to the Personnel Manager. [5398

SENIOR Design Draughtsman, accustomed to working with the minimum of supervision, required for Aircraft Component Department. Aircraft experience preferable but not essential. Salary in accordance with experience and qualifications. Reply in writing to: King Aircraft Corporation, Fifth Street, Montrose Ave., Hillington, Glasgow, S.W.2. [0420

MECHANICAL Engineers—experienced in Fuel Systems, Cooling and Heating Systems, and Power Plant Installations, required for Senior Appointment at Woodford Aerodrome, Cheshire, for work on Guided Weapons. Applications stating experience, qualifications, present salary and salary required and quoting reference WRD/Tech/R.83 to the Personnel Manager, A. V. Roe & Co., Limited, Greengate, Middleton, Manchester. [5355

STRESSMAN.—A Senior experienced Stressman, preferably holding a degree, is required for Project Stress Thermo-elasticity work on Guided Weapons at Woodford Aerodrome, Cheshire. This is a senior appointment. Applications stating experience, qualifications, present salary and salary required and quoting reference WRD/Tech/R.84 to the Personnel Manager, A. V. Roe & Co., Limited, Greengate, Middleton, Manchester. [5356

SENIOR qualified development engineers and technicians required in research department of a well-known firm of precision engineers, particularly for work in connection with Servo systems, small precision motors and gyroscopic control systems. Apply stating age, qualifications, experience and salary required to S. G. Brown, Ltd., Shakespeare Street, Watford, Herts. [0146

AIRCRAFT Jig and Tool Draughtsmen. Senior and intermediate men with aircraft experience are required in the Isle of Wight. Unfurnished accommodation will be offered to selected applicants and a staff assurance scheme and pension fund is in operation. Write, giving details of age, experience and salary expected, to the Personnel Office, Saunders-Roe, Limited, East Cowes, Isle of Wight. [5321

AERO Engine Control System Engineers are required for a newly formed department dealing with various theoretical aspects of aero engine control problems. Experience of servo mechanism analysis and gas turbine engine performance investigation is desirable. Applications quoting END to Technical Personnel Manager, Armstrong Siddeley Motors, Coventry. [0470

BRITISH Maintenance Company in Far East urgently requires maintenance engineer to undergo Britannia training prior departure. Qualifications required "A" and "C" licences any modern pressurised aircraft of Lockheed, Boeing, Douglas or Canadair types. Also maintenance electrician for similar training Viscount and Britannia. Qualifications "X" licence 24 volt systems. Box 2432. [5389

TWO A and C licensed engineers and a radio electrician for Dove aircraft are required by an American company with expanding air operations for a big oil company in the Middle East. Salary U.S. $6,000 per annum plus living expenses. Air conditioned married quarters available within three to four months. Apply in writing with full particulars to Blanford and Houdret, Ltd., Leadenhall House, 101, Leadenhall Street, London, E.C.3. [5358

## VICKERS-ARMSTRONGS (AIRCRAFT) LIMITED

**WEYBRIDGE, SURREY**

have vacancies on After Sales Service for:

(t) **AIRCRAFT SERVICING ENGINEERS** (Airframe) with 'A' licences, preferably endorsed for Viking or four-engined aircraft; for representatives work on Viscount aircraft overseas, after gaining the necessary experience at Weybridge.

(u) **AIRCRAFT SERVICING ENGINEERS** (Electrical)—an 'X' licence is preferable, but not essential, for representatives work on Viscount aircraft overseas, after gaining the necessary experience at Weybridge.

(v) **TECHNICAL LIAISON ENGINEERS** (Airframe and Electrical) in the Civil Aircraft Service Department. Applicants should be well educated, including an apprenticeship or similar training, and have had some experience on aircraft design.

Applications, quoting date and prefix letter of advertisement, to:

**Employment Manager, Vickers-Armstrongs (Aircraft) Ltd., Weybridge, Surrey.**

Holidays already arranged by applicants for this year taken into account.

## GLOSTER AIRCRAFT CO. LTD.

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**OFFERS YOU AN OPPORTUNITY TO BUILD A REWARDING AND SUCCESSFUL CAREER WITH BRITAIN'S MOST PROGRESSIVE AIRCRAFT COMPANY**

Vacancies exist on super-priority work for

### DRAUGHTSMEN

on

### PROJECT DEVELOPMENT

and

### AIRCRAFT DESIGN

(Experienced Structural, Electrical and Mechanical Draughtsmen also required. Aircraft experience not essential)

### AERODYNAMICISTS

(Of some years' experience. Fluent mathematical ability essential)

### STRESSMEN

(For both strength and flutter calculations)

### WEIGHT ENGINEERS

(Senior and Junior. To assist in the control of weights during design and development. Previous experience essential)

**These appointments are of a progressive and permanent nature, with commencing salaries based on qualifications and experience**

Our large modern factory is situated in the Cotswold Hills, with excellent canteen, sports and welfare facilities, hostel accommodation available and assistance given with housing and with removal expenses

Applications stating age, previous employers and experience, etc., should be addressed to the **CHIEF DESIGNER**

## SITUATIONS VACANT

WANTED immediately, Senior and Intermediate Draughtsmen for work on an interesting Aircraft programme. Good salaries and conditions, apply in writing with details of previous experience to: King Aircraft Corporation, Hillington, Glasgow, S.W.2. [0423

WEIGHT Control Engineer.—A Senior Weight Control Engineer with a minimum technical qualification of H.N.C., is required for work on Guided Weapons at Woodford Aerodrome, Cheshire. This is a Senior appointment. Applications stating experience, qualifications, present salary and salary required, quoting reference WRD/Tech/R.85 to the Personnel Manager, A. V. Roe & Co., Limited, Greengate, Middleton, Manchester. [5354

SENIOR Design Draughtsman required for small precision mechanical components, including pneumatic and hydraulic equipment. Applicants must have sound practical experience and preferably, Higher National Certificate or equivalent. Salary at least £800 p.a. according to qualifications. Factory 20 miles north of London. Travelling expenses, canteen facilities, life assurance and superannuation scheme. Box No. 2433. [5388

WELL known Midland aero engine company requires Mechanical Engineering Designers and Draughtsmen to join teams on various aspects of engine construction. Initial salary £650-£1,000 per annum. Owing to expansion in new drawing offices, with excellent working conditions, departments will offer good prospects to men with initiative. Sickness benefits for families and pension fund. Full details quoting Reference AD/R to Box 8565. [0467

BRITISH EUROPEAN AIRWAYS require an Engineering Instructor (Electrical) at London Airport to instruct Pilots and Engineers on electrical systems. Essential qualifications: apprenticeship in electrical engineering; 5 years' practical experience in the maintenance of modern aircraft electrical systems; technical knowledge to "X" Licence (electrical) standard. City and Guilds' Certificate or Higher National Certificate an advantage. Salary £782 10s.-£1,120 per annum, depending upon experience and qualifications Applications giving age, qualifications and experience to Senior Personnel Officer (E. & S.), Flight Operations Department, B.E.A., Keyline House, Ruislip, Middlesex. [5378

**MARSHALL**

**AIRPORT WORKS CAMBRIDGE**

**Required for 'on site' work**

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**AIRFRAME FITTERS**

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**Modification and Repair Modern Jet Aircraft**

Comfortable hostel accommodation (single or double cubicle) with good food whilst on familiarization at Cambridge.

Generous subsistence and other allowances 'on site.'

Send full particulars, experience, etc., and when available, to

**EMPLOYMENT OFFICER**

**GENERAL MANAGER REQUIRED**

**for**

a large British-owned aircraft repair and overhaul company in the Far East. Applicants should have a background of engineering and company management with world-wide aviation contacts. Experience abroad an advantage. Age between 35 and 45.

**Box No. 2260 c/o "Flight."**

## SITUATIONS VACANT

CYPRUS AIRWAYS has an immediate vacancy for a pilot holding a junior commercial licence endorsed for Auster J-5 aircraft, an instrument rating and a radio telephony licence. Duties include crop-spraying and dusting and banner towing; previous experience in these very desirable. Total initial emoluments worth at least £1,500 per annum for single men, more for married. Applications giving fullest details by air mail to Secretary, Cyprus Airways Limited, Nicosia, Cyprus. [5387

ASSISTANT Welding Engineer required by a large engineering organisation in the South of England, who are engaged on the manufacture of jet engine aircraft components. This vacancy calls for an applicant with both practical and theoretical experience in metallic arc and argon arc welding, both manual and mechanical, on ferrous and non-ferrous materials. Suitable applicant will be given salary commensurate with his experience. Applications to be made in writing, giving full details. Box No. 2463. [5394

STRENGTH of Materials Laboratory working on research and development in connection with combustion equipment for aero gas turbines and similar projects, has vacancies for experimental personnel. Men who have been senior N.C.O.s and petty officers with aircraft engineering experience might be particularly interested in work on projects in hand. Apply in writing, giving full particulars of training and experience to The Personnel Manager, Joseph Lucas Limited, Hargher Clough Works, Burnley, Lancs. [5335

WANTED, Draughtsmen to design in aluminium for sales development. Must possess Higher National Certificate in Mechanical Engineering. Location Banbury. Good working conditions and pleasant surroundings. Attractive starting salaries offered up to £800 p.a. with prospects of promotion from drawing board. Pension plan in operation. Send brief details of qualifications and experience to Northern Aluminium Co., Ltd., Bush House, Aldwych, London, W.2. [0348

SENIOR Aircraft Stress Engineers are required by a South of England Aircraft Company. Applicants must have a minimum of 6 years' experience. Salaries £800 to £1,100 per annum according to experience. New Houses to rent will be offered to those appointed. Good employment conditions and a Superannuation and Life Assurance Scheme is in operation. Please send full particulars of experience to Box A.C.15974, Samson Clarks, 57-61 Mortimer Street, London, W.1. [0280

ARMSTRONG SIDDELEY MOTORS invite applications from Junior and Senior Mechanical Designers and Technical Assistants to join their project design team for work on aircraft gas turbines and a variety of other fascinating problems associated with supersonic flight. This is an exceptional opportunity for the above average designer accustomed to higher class work and with a flair for inventiveness, originality and responsibility, to gain experience and knowledge in pleasant surroundings. Very attractive salaries will be paid for experience. Application quoting Reference SR/DA to Technical Personnel Manager, Armstrong Siddeley Motors, Coventry. [0464

FERRANTI LIMITED, Edinburgh, invite applications for staff appointments as Field Trials Engineers to join teams engaged in the field trials of experimental radar and navigational systems. Although primarily based at Edinburgh, much of the work necessitates travel within the U.K. while one or two of the posts will require overseas travel. Applicants should possess a Degree, H.N.C. or equivalent in electronics or electrical engineering and have had at least three years' experience in centimetric radar techniques. Salary according to age, qualifications and experience. Please apply to the Personnel Officer, Ferranti Limited, Ferry Road, Edinburgh, 5, quoting Ref. FTE/TID/39. [5379

FERRANTI LIMITED, Edinburgh, require an Engineer with Diesel/petrol/electric and electronic experience to join a team of Field Trials Engineers engaged in the field trials of experimental radar and navigational systems. The work involved is mainly connected with the running and maintenance of Diesel generating plant and petrol-driven cooling plant but assistance in maintaining the mechanical and electrical aspects of the radar equipment will be expected. Qualifications up to H.N.C. standard preferable but not essential, with at least three years' experience in dealing with such plant. Although primarily based at Edinburgh, much of the work necessitates travel within the U.K. Salary according to age, qualifications and experience. Please apply to the Personnel Officer, Ferranti Limited, Ferry Road, Edinburgh, 5, quoting Ref. E/TID/29. [5380

BRITISH WEST INDIAN AIRWAYS, Trinidad, require the services of an operations planning officer. Duties include planning the application of aircraft and crews to routes, and associated matters. Essential qualifications are a knowledge of the history and economics of transport generally and of elementary statistics. Good mathematical ability and ability to co-ordinate ideas and requirements for presentation of a positive plan. A knowledge of the principles of modern aircraft performance and operating techniques are desirable additional qualifications. Salary in the range BWI $600-700 per month plus cost of living allowance of approximately BWI $47.28 p.m. (BWI $4.80=£1). Excellent provident scheme in force producing substantial gratuity after ten years' service. Local leave 14 days p.a. with 3 months U.K. leave after each period of three years. Applications to A/Personnel Officer (Associated Companies), B.O.A.C. Headquarters, P.406, London Airport, Feltham, Middx. [5395

## SITUATIONS VACANT

DEVELOPMENT Engineers and Physicists are required for work in the new and rapidly expanding laboratories of Louis Newmark, Ltd., at New Addington, Surrey. The work includes the design and development of instruments and equipment for the aircraft and allied industries, and some working experience of small electromagnetic instruments is desirable. Good salary based on age and experience. Pension scheme. Apply in writing giving full particulars to: Personnel Officer, Louis Newmark, Ltd., Prefect Works, Purley Way, Croydon. [5381

BRITISH WEST INDIAN AIRWAYS, Trinidad, require the services of an assistant planning engineer. Duties include planning of component and accessory routine maintenance checks, overhauls, repairs and modifications. Salary BWI $425 per month plus cost of living allowance of $47.28 p.m. (BWI $4.80=£1). Excellent provident scheme in force producing substantial gratuity after ten years' service. Local leave 14 days p.a. with 3 months U.K. leave after each period of three years. Applications to A/Personnel Officer (Associated Companies), B.O.A.C. Headquarters, P.406, London Airport, Feltham, Middx. [5396

## SITUATIONS WANTED

YOUNG man, 21, P.P.L., ex aircrew, requires any post in aviation. Box 2513. [5406

CAMBRIDGE graduate, 26, comm. licence, air charter admin. and ops. experience, seeks interesting post, flying or ground. Box No. 2418. [5383

## BOOKS, ETC.

PLASTICS Progress: Papers and Discussions at the British Plastics Convention 1955. The complete text, illustrated, of the papers together with a full report of the discussion. Subjects include: Polymer Structure and properties; Expanded plastics; Thermo plastics; Extrusion; Work study and productivity; Injection moulding; Patents; Foundry Resins; and Glass reinforced plastics. 50s. net from all booksellers. By post 51s. 8d. from Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1.

**TRAINEE DRAUGHTSMEN**

Applications invited from suitable men for training with a view to employment as Draughtsmen.

Applicants should preferably:

(a) Be not over 25 years of age.

(b) Have completed National Service.

(c) Hold at least Ordinary National or City and Guilds Certificates, and have a practical background, preferably apprenticeship: or hold G.C.E. with "A" level subjects, including technical drawing.

A reasonable salary will be paid during the period of training which will not exceed one year.

Detailed written applications to:

**The Personnel Supervisor, HAWKER AIRCRAFT LIMITED, Canbury Park Road, Kingston-on-Thames, Surrey.**

**AERODYNAMICISTS**

**FLUTTER TECHNICIANS**

**STRESSMEN**

**SENIOR AND INTERMEDIATE DRAUGHTSMEN**

are urgently required for an extensive and super priority Guided Missile programme.

Applications will be treated in strictest confidence, and should be addressed to the

**PERSONNEL MANAGER, AIR SERVICE TRAINING, LTD., HAMBLE, SOUTHAMPTON, HANTS.**

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"BRIGHTER Photography for Beginners," by David Charles, F.R.P.S. Describes the whole photographic process without tedious explanations of optics, physics, chemistry or mathematics. This edition, revised throughout and lavishly illustrated, is the obvious choice for those who want a non-technical explanation of how to succeed with a camera. Fourth Edition. 6s. net from all booksellers. By post 7s. 0d. from Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E.1.

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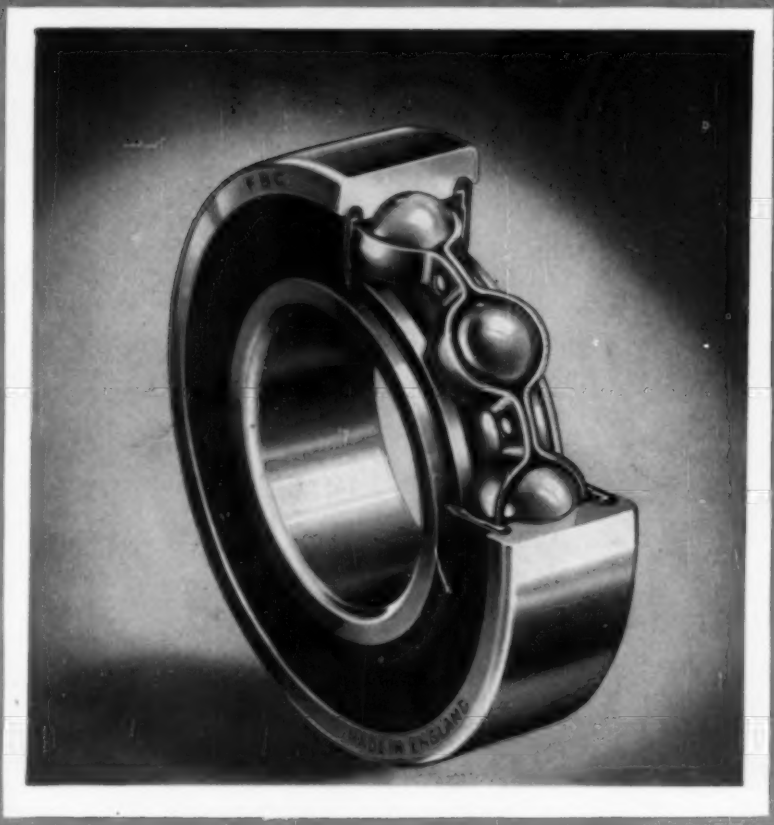


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